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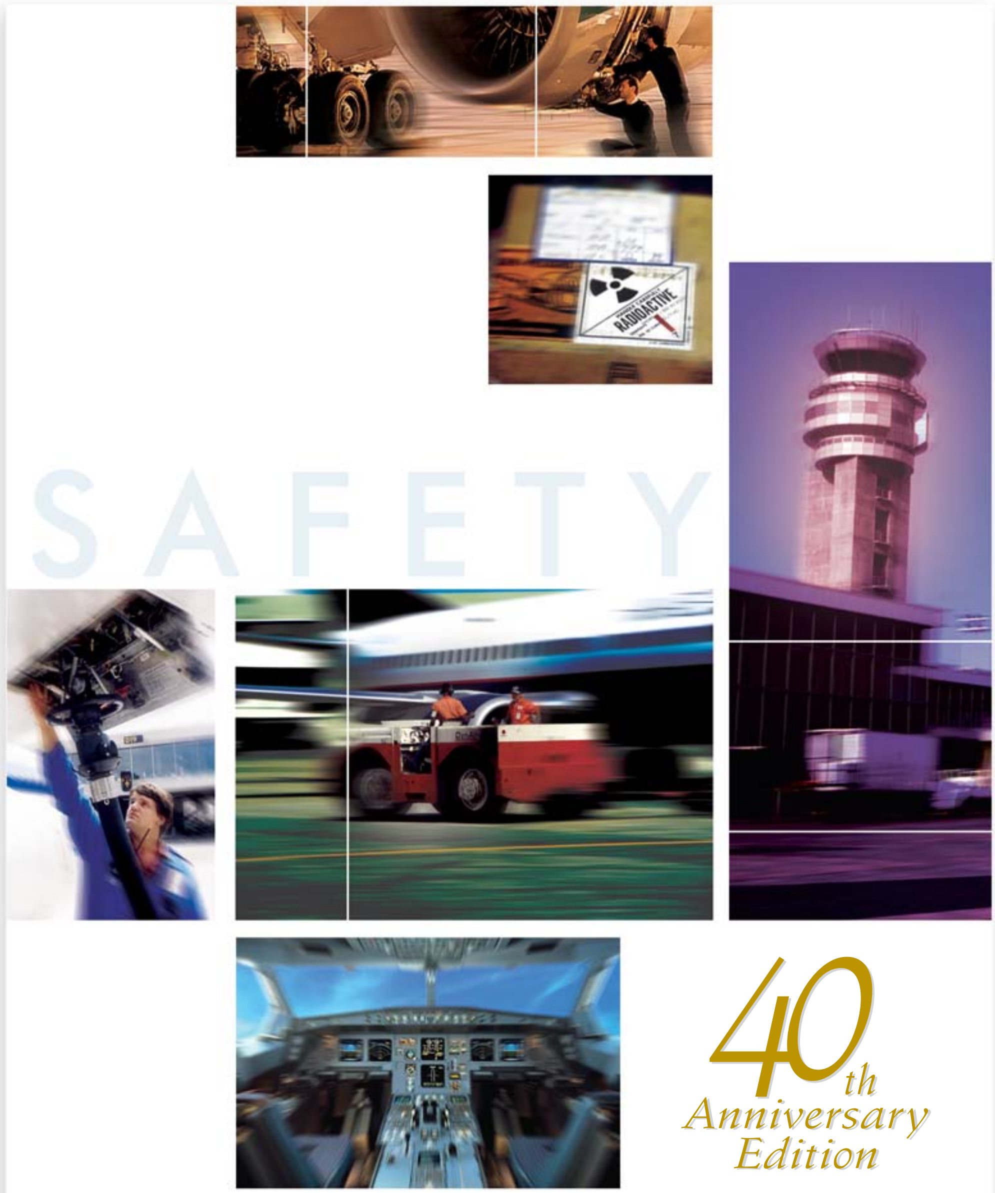

Safety Report 2003

Issued April 2004

International Air Transport Association

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Montreal — Geneva

NOTICE

Safety Report 2003
Ref. No: 9049-04
ISBN 92-9195-181-1

Montreal — Geneva

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FOREWORD

2003 marks the 40th anniversary of IATA publishing Safety Analysis of the year's accidents.

IATA's Safety Committee (SAC) has been discussing accidents and producing safety statistics since the start of SAFAC (now SAC) in 1963.

Initially the report was part of the SAFAC documentation and eventually became a stand-alone document, and it was mailed in black and white photocopy to safety managers. Until the end of the 1990's the Safety Report was largely a statistical representation of historical accident data and the contributing factors to the accidents of the previous year.

2001 saw a major change to the Safety Report. The aim was to provide Airline Safety Managers with a safety tool rather than accident data. The focus shifted toward enriching the recommendations, prevention strategies and lessons learned. The Jet and Turboprop reports were combined into one book and printed in colour to enhance the interpretability of the charts. The analysis section was greatly expanded and a CD-ROM was developed with valuable tools including information targeted at CEO's. It has also become the main vehicle for communicating integrated solutions and IATA's Airline Safety Strategy.

The IATA Safety Report is unique! Often the industry awaits the results of formal accident investigations to discover the lessons learned, a process that can take years. While there are many organisations publishing safety statistics early in the new year, IATA, and its members, believe that statistics alone do not help airlines improve safety. It is through the analysis of the accidents that lessons learned and prevention strategies are uncovered and can be communicated to the airline community to improve safety.

The Safety Report is made possible because of the support and dedication of the airlines. I wish to thank the SAC and its ACWG as well as the safety team at IATA.

Along with IATA Operational Safety Audit (IOSA) and IATA Safety Intelligence (iSAFi), the Safety Report is another tool towards attaining our safety goal: **"To lead the global airline commitment for continuous improvement in safety" and reduce the accident rate a further 25% by 2006.**

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
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

EXECUTIVE SUMMARY

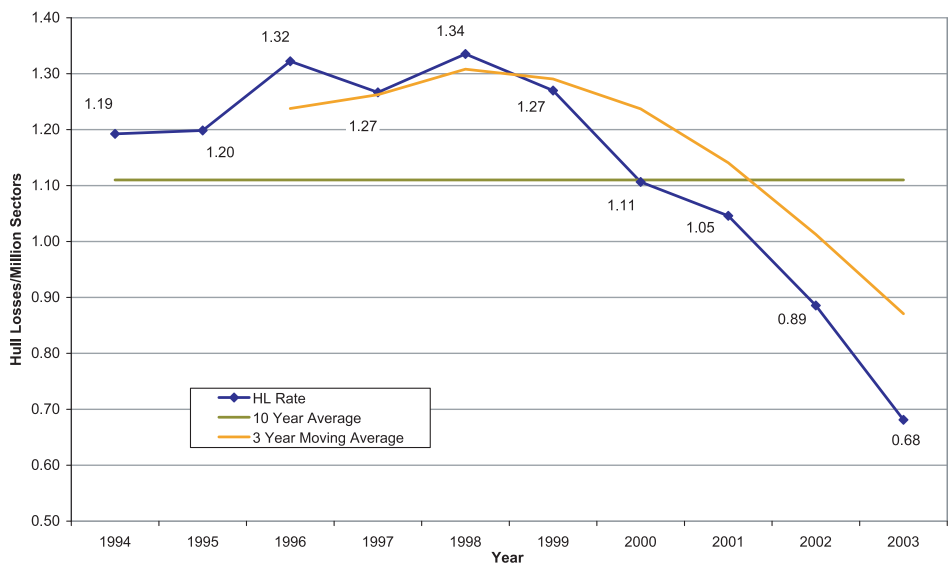
The IATA Safety Report, published annually, analyses the accidents of the previous calendar year, identifying areas of concern and offering prevention strategies and recommendations to the industry.

SUMMARY OF ACCIDENTS FOR 2003

Total Accidents: 92, compared with 85 accidents in 2002

- 42 Western-built Jet;
- 32 Western-built Turboprop;
- 7 Eastern-built Jet;
- 11 Eastern-built Turboprop.

Western-built Jet Hull Loss Rate 1994-2003



Of the 92 accidents, there were 21 that resulted in 663 fatalities. In 2002 the number of fatalities was 974 from 32 accidents. The Hull Loss rate for Western-built Jets is down by 23.6%. Compared to previous years this is one of the lowest on record.

IATA and the industry need to focus on the following issues, as agreed and supported by the Operations Committee and the Safety Committee:

- **The impact of poor operational decisions on flight safety:** The adoption by flight crews of courses of action that unnecessarily increased operational risks underlies many accidents and incidents during 2003. This was frequently manifested by the continuation of unstable approaches that were outside parameters defined by SOPs, when the option of a Go-around, and the time to execute it, were available. *Airline executives should ensure that audit, training and checking programmes support conservative decisions in the interest of safety.*

- **The contribution of maintenance and technical failures to accidents:** Technical issues precipitated 26% of all accidents, however the accident scenario is often a combination of the precipitant technical failure and the handling of the technical failure by the flight crew. Technical failures, and the handling of these failures, were more predominant in certain regions and in certain types of operations. *Therefore, efforts should be regionally targeted on the auditing of company maintenance, developing human factors training in maintenance and improving flight crew training for handling technical failures.*

- **The influence of weak regulatory oversight:** Regulatory Oversight cited as contributor to 36% of accidents in 2003. This is consistent with previous years, where there is a strong correlation between accidents and the lack of regulatory oversight, particularly in Africa. *IATA will maintain pressure on regulatory authorities combined with efforts by airlines to apply pressure through alliances and code shares.*
- **Risks associated with approach and landing:** Approach and Landing accidents continue to represent the highest threat category at 58% of all accidents. The failure of crews to recognise an unstable approach and then make a timely decision to conduct a Go-around, especially in poor weather, was the major factor in the accidents under review. *IATA SAC will create Task Force to study Go-around decision making.*
- **Controlled Flight Into Terrain:** There were 8 CFIT accidents, which accounted for 136 fatalities. Meteorological conditions were linked to all 8 accidents, and in 7 of these, proficiency issues were also mentioned. *Airlines and regulators should work towards eliminating step-down approaches. As was highlighted in the 2002 Safety Report, Enhanced Ground Proximity Warning Systems (E-GPWS) could have prevented these accidents, therefore all passenger and freighter aircraft should be upgraded with E-GPWS.*
- **The threats specific to cargo operations and ferry flights:** Operating an aircraft in a cargo only configuration, ferry operations or without passengers continues to attract a disproportionate share of *accidents. IATA should maintain present cargo safety initiatives, and airline management should emphasise that flights without passengers are to be performed to the same operating standards as flights with passengers.*

Through safety successes, contemporary aviation has been transformed into an ultra-safe system, which is defined by experiencing less than one accident per million departures. Technology, human factors and risk management, SMS, change management, engineering reliability and maintainability were the foundations of the prevention strategies that contributed to reducing the accident rate from 1.19 per million departures in 1993 to 0.68 in 2003. Still, preliminary analysis of the 2003 accidents demonstrates that these successes should now be focused on distinct sub-systems that exist in the overall system of the international air transport industry. For example airport infrastructure, developing radar systems, enforcing sound operational practices and implementing specific training, checking and auditing programmes may help reduce the accident rate in the developing world, whereas in the other regions of the world that experienced fewer numbers of accidents, efforts to promote safety should take on new forms, for instance emphasising a data-driven Safety Management System.

These issues are developed further in the prevention strategies and recommendations that arise from the analysis of the 2003 accidents. These prevention strategies covering the operational, training, engineering and organisational aspects of safety are made in the relevant sections of the report, presented in full at Annex 3 and summarised in Chapter 6.

Inherent in these prevention strategies is the data-driven approach within a sound SMS and the use of operational safety auditing as a powerful antidote to safety threats. Certainly from this analysis of the 2003 accidents, IATA Operational Safety Audit (IOSA) is seen as the primary tool in IATA's commitment to prevent accidents.

CHAPTER 1 — INTRODUCTION

> ***"It is possible to fly without motors, but not without knowledge and skill."***
>
> *Wilbur Wright*

1.1 A CENTURY OF FLIGHT

As the first century of powered flight came to a close, an extraordinary performance in aviation safety took place at the IATA 2003 AGM in Washington, DC. In the midst of extreme turmoil in the aviation industry, five industry leaders came together in an open forum to focus intensely and exclusively on safety. Their presentations, along with the resulting discussion, showed each had a deep understanding of their organisation's respective safety systems and culture, and provided a unique insight from the boardroom. These presentations contained "pointers" if you will, that indicated the likely course the industry will be taking in the near and distant future regarding safety. It is therefore fitting that this report will begin with some of these insights and then develop a framework for IATA's approach to safety from hereon.

While reaching for the wisdom from that forum at the AGM, this Safety Report will be augmented by the findings of a group of the finest safety specialists today. This group is the IATA Accident Classification Working Group (ACWG). Once again, they have been instrumental in the verification and classification of data in this Safety Report, as they have been in their previous incarnations for the last 40 years. From this combination of views from CEOs and safety managers, a new focus for IATA Safety in 2004 and beyond will be developed through the medium of this report.

Safety can no longer be looked at as "someone else's problem." It is not a discipline affecting only a minority of an operators employees, it is a responsibility that must be shared by everyone. What we are beginning to see is the treatment of safety as a great system, a Safety Management System (SMS), rather than a function of a few. An excellent way to highlight this beginning is to cite Robert Milton, President and CEO of Air Canada, speaking at the AGM:

"We see SMS as an evolution in Air Canada's commitment to safety... That's not just a platitude, it's a measurable commitment, and for a truly successful airline, everything else flows from this."

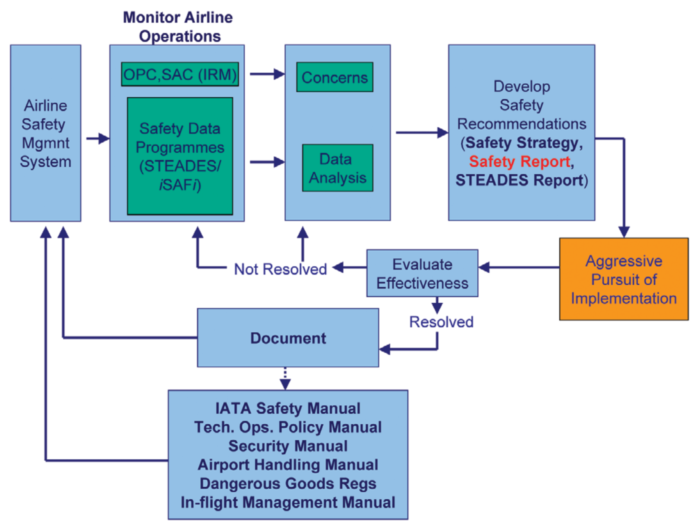
— Robert Milton,
President & CEO,
Air Canada

This 40th Anniversary Safety Report is the embodiment IATA's long-standing commitment to safety management. This is exemplified by the valuable work of the Safety Committee (SAC), and the ACWG, since 1963. The continuous evolution of the Report has been such that it is now positioned at the centre of IATA's Safety Management Support System (SMSS).

Fundamental to the SMSS (Figure 1.1.A) is IATA's new data driven approach, thriving on new programmes such as the IATA Operational Safety Audit (IOSA) and STEADES/iSAFi. Thus, the SMSS becomes a cornerstone for the development of future IATA Safety Strategy that aims to make an incredibly safety transportation system even safer.

Figure 1.1.A

IATA Safety Management Support System



1.2 IATA'S ANNUAL SAFETY REPORT

IATA is at the core of the world's international airline industry. Originally founded in 1919, it now groups together over 270 airlines, including the world's largest. These airlines fly over 98% of all international scheduled air traffic. It is upon this vast and highly representative experience that IATA draws when determining the lessons learned from accidents, most of which involve aircraft that are not in the IATA fold.

Produced immediately following the year under review, the report examines not only the accident statistics and trends, but it also attributes contributory factors to those accidents and leads to prevention strategies and recommendations to the industry. The approach to this analysis, for what follows is truly a global safety analysis, will be to look back at the accident trends over the last decade and then review 2003 in detail. The report will show how the ACWG has driven down into the contributory factors, in most cases identified for the first time well ahead of formal accident investigation. Finally, the report will offer recommendations for accident prevention, which will help shape IATA's airline safety strategies and those of the industry for years to come.

The Safety Report also reflects the work of IATA, communicating the important Safety issues identified by IATA's Operations and Safety Committees and Working Groups, including those in the Security arena. Therefore, the Safety Report helps the airlines to understand the global safety situation and thus react quickly to the threats to aviation safety.

1.2.1 Purpose of the Safety Report

The purpose of the Safety Report is fully described in **Appendix B** 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 2003. The report is taking an increasing interest in air safety incidents, seeing them as useful pointers for accident prevention. It presents data and trends, analyses and recommends preventative measures.

1.2.2 Safety Report Format

The ambitious technique used by IATA to analyse, early in the new year, the accidents (and increasingly the incidents) of the previous year has been retained. This process is seen as a key component of the IATA Safety Management Support System (SMSS).

The most noticeable change with this new Safety Report is the move towards presenting not only areas of concern and high risk, combined with prevention strategies and recommendations to the industry, but it also provides direction to safety management information and tools.

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.

Although the additional information that is found on the CD-ROM is not exhaustive, it does serve as an indication of some of the valuable tools for accident prevention, which have come to IATA's attention during 2003. All of these components form this new Safety Report.

1.2.3 Accident Classification Working Group

The IATA Safety Committee (SAC) created the Accident Classification Working Group (ACWG), formerly known as the Classification Working Group (CWG), in order to identity contributing factors in accidents, determine trends and matters of concern in aviation safety worldwide from the accident database available and to develop prevention strategies and recommendations related thereto, which are incorporated into the annual IATA Safety Report.

The ACWG is composed of highly committed airline safety professionals from IATA member airlines and representatives from the aeronautical industry and regulatory boards. The group is instrumental in the analysis of accidents in order to produce a safety review based on subjective evaluations for the classification of accidents. IATA acknowledges the contribution to the Safety Report made by Airclaims Ltd. in the research and preparation of the accident narratives and the development of the accident statistics published here.

Appendix A on the CD-ROM further describes the role of the ACWG in more detail. Participants in the 2003 sessions were as follows:

Captain Louis Thériault	Air Canada	Chairman
Captain Deborah Lawrie	KLM Cityhopper	Vice-Chairman
Captain Bertrand de Courville	Air France	
Captain Angelo Ledda	Alitalia	
Mr. Alan Rohl	British Airways	
Captain Yoshiyasu Takano	Japan Airlines	
Captain Ngeny Biwott	Kenya Airways	
Dr. Dieter Reisigner	Lauda Air	
Captain Klaus Froeset	Lufthansa	
Captain Saad Al-Shehri	Saudi Arabian Airlines	
Captain Jürg Schmid	Swiss	
Mr. Jean Daney	Airbus	
Mr. Paul Hayes	Airclaims Ltd.	
Captain David Carbaugh	Boeing	
Mr. Jim Donnelly	Bombardier	
Mr. Nuno Aghdassi	Embraer	
Wing Commander David Mawdsley	IATA	
Ms. Jill Sladen-Pilon	IATA	

Captain Doug Stott	IATA
Captain Daniel Maurino	ICAO
Captain Lou Van Munster	IFALPA
Mr. Bert Ruitenberg	IFATCA
Mr. Jim Terpstra	Jeppesen
Ms. Sandra Stedman	Jeppesen
Mr. Don Bateman	Honeywell

1.2.4 Report Authority

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

1.3 IATA GOVERNANCE

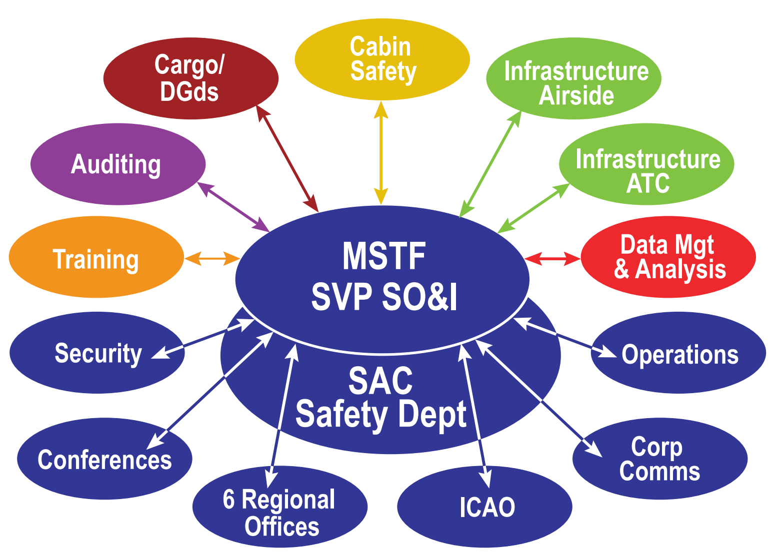
1.3.1 Operations Committee and the Safety Committee

The IATA Safety Management Support System (SMSS) is governed by the Operations Committee (OPC) and the Safety Committee (SAC). The OPC was created to advise the IATA Board of Governors, and the Director General, on all matters that relate to the improvement of safety, security and efficiency of civil air transport. The SAC reports to the OPC to assist in all matters that relate to the optimisation of airline safety. In this way the OPC and SAC airline representatives help to formulate IATA's safety strategies and trigger the initiatives based on their experiences and their perception of the threats to safety.

1.3.2 Incident Review Meeting (IRM)

Part of the SAC is the Incident Review Meeting (IRM), which is particularly valuable in providing a unique opportunity for Safety Executives to share in confidential session the experience of accidents and incidents that their airlines may have suffered. Apart from being a safety information exchange, the IRM is also an important part of IATA's information collecting process. It assists IATA Safety to remain sensitive to the safety concerns of its member airlines and complements the work of the ACWG. Additionally, the SAC deploys the ACWG in the role described at **Appendix A** on the CD-ROM These forums have been the traditional "input" to the IATA safety system for many years. However, IATA's new safety initiatives are already beginning to contribute to the information gathering process of IATA's SMSS. It is therefore pertinent to report on the implementation of these initiatives arising from IATA's Safety Strategy.

Figure 1.3.A
Multi-Divisional Safety Task Force (MSTF)



1.3.3 Multi-divisional Safety Task Force (MSTF)

The 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. The MSTF continues to be an integral part of the IATA SMSS. 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 IATA senior management, and the Senior Vice-President, Safety, Operations and Infrastructure chairs the group. The MSTF transends both organisational and geographical boundaries within IATA by involving not only members from multiple divisions, but in multiple locations around the world. Finally, it must be stressed that the MSTF is fully integrated with all IATA Safety activities and helps ensure consistent management of the Safety Strategy.

1.4 IATA SAFETY PROGRAMMES

1.4.1 Overview

The IATA Safety Programme is driven primarily by the ambitious goals set by the airlines at the IATA Board of Governors (BoG) at their last meetings. These goals determine the direction of IATA safety initiatives in the new year. At the last BoG meeting, the board set down three important goals stretching over the next two years:

- Reduce the global accident rate by 25% by 2006
- Implement Safety Management Systems (SMS) in 50% of IATA member airlines by 2006
- Implement the new IATA six-point Safety Programme

To achieve these goals, strong industry leadership is needed, and IATA for its part is rising to the challenge. IATA has crafted this leadership role to ensure that it blends with the other global safety initiatives of ICAO, the Flight Safety Foundation, the aircraft manufacturers, the ATA, IFALPA and the regulatory authorities. Most importantly, IATA's leadership role has to do with the airlines — to lead the global airline commitment to achieve a continuous improvement in safety. Although the programme is only introduced here, more information can be found in Chapter 5.

1.4.2 Safety Strategy: Past and Present

Safety Strategy 2000+ was developed in the late 1990's and sought to "lead the global airline efforts to achieve a continuous improvement in Safety." It focused on 8 broad areas that together embraced the larger concept of safety management systems. The CEO and Director General of IATA, Giovanni Bisignani, and the rest of the IATA senior management team, have called for concrete, measurable goals and a commitment to deliver them. Therefore, Safety Strategy 2000+ as it existed was deemed too broad and not specific enough for current industry needs.

The safety team has received a clear mandate from the top of IATA and the industry to focus not on efforts but on commitments. As such, the strategy line now reads **"lead the global airline commitment for a continuous improvement in Safety."** This strategy focuses around a six-point safety programme that encompasses not only operational flight safety, but also cargo/dangerous goods, infrastructure safety, training, auditing, data management/analysis and cabin safety. Each of these areas contribute to the achievement of the goals of IATA, the MSTF and SAC.

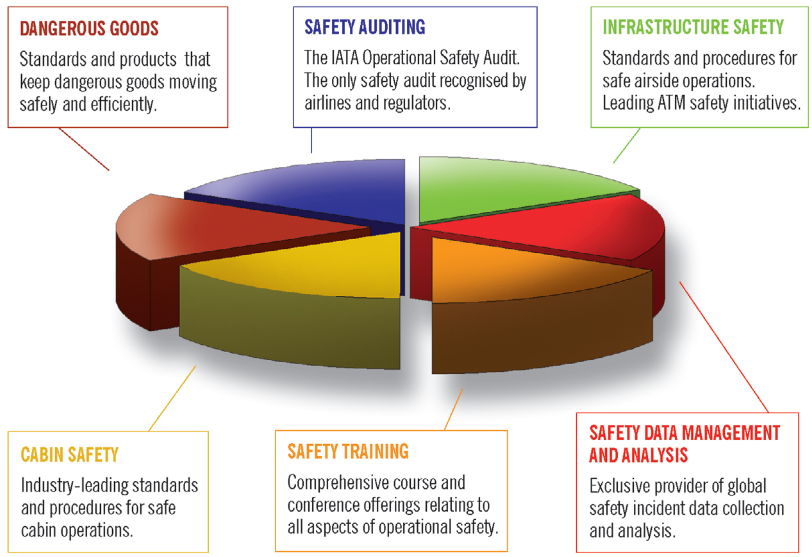
1.4.3 Reducing the Accident Rate

This battle to reduce the accident rate by 25% is one that can be fought and won, but it must be fought on a broad front and we need to choose the appropriate tools and methods for the task. Improvements in specific areas of concern, such as cargo operations and infrastructure will greatly assist in this endeavour. Also, data collection and analysis remains key to monitoring progress and making the correct adjustments to resource deployments to obtain the best possible results.

1.4.4 Safety Management Systems

A system safety view is prominent in the industry, and the value of Safety Management Systems (SMS), both in safety and financial terms, is now being realised. Safety training, auditing in the form of IOSA, and thorough data-driven evaluation of safety activities in airlines will all contribute to SMS development.

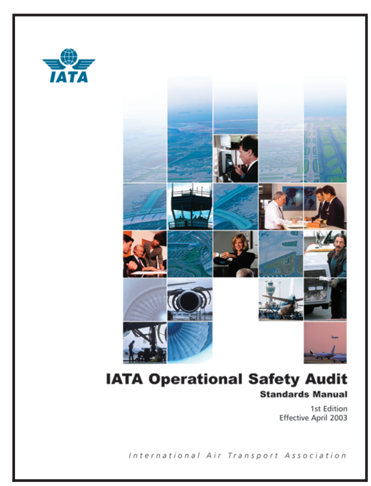
1.4.5 Six-point Safety Programme



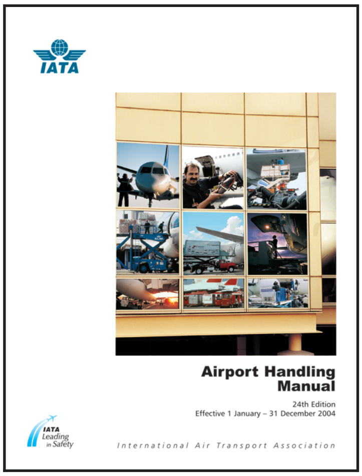
The IATA Six-point Safety Progamme reflects the new strategic direction that IATA has taken to ensure that these goals are met. Established in close cooperation with the airlines through SAC, OPC and the MSTF, the programme focusses not on one, but on a system of areas that need to be combined to improve 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. Although the programme is only introduced here, more information can be found in Chapter 5. All IATA publications discussed in this section are available through the IATA online store at www.iataonline.com.

Safety Auditing

The auditing area is largely focused on the IATA Operational Safety Audit (IOSA). IOSA provides a standardised audit programme based on internationally recognised standards and a structured system for the sharing of audits in order to help improve operations and reduce the number of audits in the industry. IOSA will use internationally recognised quality audit principles, and is designed so that audits are conducted in a standardised and consistent manner. IOSA is currently in initial operation. The IOSA Standards Manual (ISM), seen at right, is the reference used by both operators undergoing audits and the auditors themselves. The ISM most recent version, 1st Edition Revision 1, December 2003, is available from the IATA online store to operators interested in undergoing the audit. More information can be found at www.iata.org/iosa.



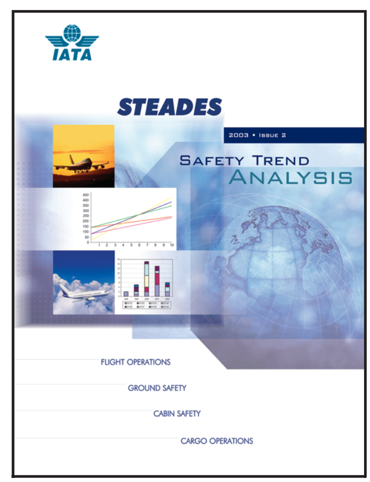
Infrastructure Safety



Infrastructure safety covers both Air Traffic Management and Ground Safety. In ATM, sharing of safety information among Air Navigation Service Providers (ANSPs), regulators, and operators is key to reducing incidents such as runway incursions, level busts, communication misunderstandings and clearance errors. Regional activities are also in full force, such as the newly established AFI Safety Enhancement Team (ASET) in Africa, with a view to correctly identify causes and trends and actively promote corrective actions. ASET brings together regulatory authorities, air navigation providers, airport operators, airlines and aircraft manufacturers. Other efforts are also underway in the other regions. The IATA Ground Handling Council (IGHC) is actively involved in matters of ground safety, and completes the infrastructure aspect from the airport end. Damage to aircraft and property by ground equipment is a continuing source of concern. The group has undertaken a review of existing Airside operational activities to determine their validity in the current environment. The ASG will provide recommendations for change of practices as necessary. IATA best practices from these two realms are incorporated into the Airport Handling Manual (image left), which is a must-have for any operator.

Safety Data Management & Analysis

Safety Data Management & Analysis (SDMA) is one of the focal points of the new programme. Quality managers claim that without data, you are only another opinion, and the time of opinions in aviation safety has long passed. The core of this piece of the pie is iSAFi, the next generation of STEADES, that will include not only Air Safety Report (ASR) trending, but also risk-based, customised reports, Flight Data Analysis (FDA), and an attention to industry and government awareness of key safety issues. iSAFi fills the concerning gap in incident analysis. Built upon the existing STEADES platform, iSAFi is already leading in the global safety analysis arena. The primary communication vehicle of iSAFi is the Safety Trend Analysis report, shown at right. More information can be found at www.iata.org/soi/safety/steades.

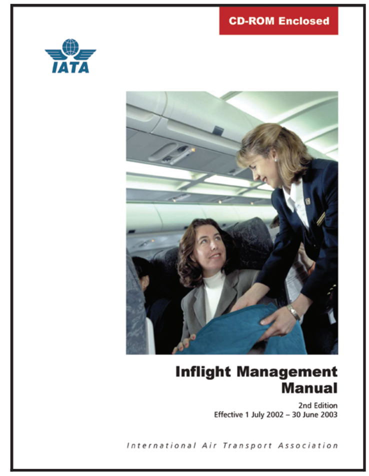


Safety Training

In order to drive down the accident rate and to showcase the benefits of a SMS, proper skills for safety professionals are needed. The IATA Aviation Training & Development Institute (ATDI) has developed a comprehensive list of courses that give any airline professional the foundations needed to successfully develop a company-wide SMS, as well as covering the entire spectrum of the six-point safety programme, including airside/ground safety and cargo operations. An up-to-date training calendar featuring all IATA courses, and an online registration form can be found at www.iata.org/atdi.

Cabin Safety

As part of IATA's coordinated safety strategy, the IATA MSTF and the Safety Committee have taken over responsibility for IATA's cabin safety programme. The cabin safety programme promotes standards and procedures for safe cabin operations. Through a data-driven approach, threats to cabin safety are highlighted and prevention strategies are developed. The Cabin Safety Working Group is composed of cabin safety specialists who determine areas of concern and develop recommended best practices, which are presented in the IATA In-flight Management Manual. More information on cabin safety can be found at www.iata.org/whip/csafwg.



Cargo Safety

IATA has been actively involved in Dangerous Goods (DG) since 1953. This early work culminated in the publication of the first edition of the IATA Dangerous Goods Regulations (DGR) in 1956. Prior to ICAO introducing Technical Instructions to states, the DGR material was adopted by many states as the legal requirements for the transportation of DG by air in their jurisdictions. The DGR (seen below) is not a stand-alone volume, but is supported by an integrated family of tools, including training, publications and awareness programmes. This system is further integrated into the IATA MSTF and SMSS, where cargo operations inputs to other IATA safety initiatives is discussed. More detailed information is available from the IATA DG web site: www.iata.org/dangerousgoods.

1.5 MONITORING AIRLINE OPERATIONS

This introductory chapter has described the primary components of the IATA SMSS. Having explained the role of the OPC, SAC and the ACWG, the chapter has shown how safety data systems and information exchange systems are increasingly contributing to IATA's SMSS and how these are being developed to assist with more effective monitoring of airline operations. This is not a big-brother function; rather it reflects a customer-driven, more business-like approach to safety being taken by IATA. The crux of these monitoring systems is the non-punitive, or "just culture" environment that must exist at an airline for them to thrive. Many airlines have already implemented these systems and the payoffs are already beginning to materialize. Instead of events going unnoticed, they are reported as and when they occur so that action can be taken. Qantas CEO Geoff Dixon, speaking at the 2003 IATA AGM, said the following about demonstrating a "no blame" culture at his airline:

"...if you can obtain information regarding minor incidents, you can prevent them developing into major ones... The value of a strong, robust safety reporting culture is that it will ensure minor incidents are not left uncovered."

— Geoff Dixon,
CEO, Qantas

Had non-punitive safety cultures that promote open reporting systems been more widely implemented, there may have been fewer accidents in 2003. Therefore, the IATA Safety Report will address the accidents of the year 2003 and search for ways in which IATA, its airlines and others with the same ideals can prevent accidents. It will show how the Safety Report can play its part within the IATA SMSS and maintain IATA's focus where it best serves its members and customers. The Safety Report will look forward in terms of IATA's six-point safety programme and offer intervention strategies.

The safety metrics to be used by IATA SMSS are fully described in **Annex 1.** As there have been major changes to the classifications in 2003, a review of this Annex is highly advised.

Today, the ease with which data is exchanged internationally is unprecedented and arising from this is the need to standardise definitions. There are a number of industry initiatives and working groups attempting to do this for the benefit of the Industry as a whole. IATA Safety has endeavoured to participate in this activity in an effort to ensure that this report aligns with the latest safety definitions and metrics.

1.6 IATA REGIONS

At the time of writing the 2003 Safety Report, IATA delineates between regions using the definition set out by IATA's Regional Technical Conferences and Regional Coodination Groups. **Refer to Appendix C** on the CD-ROM. There is, however, a move in the industry toward aligning the definitions of regions for the purpose of representing regional safety information. There are many organisations producing safety statistics as they relate to regions of the world. Unfortunately there has been little coordination between these organisations and the definitions used, which can lead to variances in the statistics. The Safety Indicator Study Group of ICAO, of which IATA is a member, is endeavouring to develop definitions for regions which are no longer based on jurisdictions of regional offices but based on geographic location of the land mass where the accident occurs or the operator's region of origin. The aim is that through the work of this study group, agreed regional definitions will be developed and thus enable the industry to move yet another step closer to aligning safety statistics.

1.7 CONVENTIONS

IATA salutes the longstanding and valuable contribution of ICAO in the area of global accident statistics. The work of the ICAO/Commercial Aviation Safety Team (CAST) in establishing Common Taxonomy of Aviation Occurrence categories has been invaluable. IATA works in close co-operation with ICAO's Safety Indicators Group and assists ICAO with their categorisation of accidents. For a variety of reasons, however, ICAO does not conduct in-depth analysis of accident and incident factors of the kind included in Chapters 3 and 4 of this Safety Report. ICAO's work is therefore limited to the categorisation of the accident e.g. CFIT or ALAR. IATA has however, already developed the means of turning safety occurrence (accident and incident) data into useful information by using some powerful analysis tools. This Safety Report is one such tool.

CHAPTER 2 — DECADE IN REVIEW

This chapter presents the record of accidents of the past ten years and compares it to the data for 2003 for Western-built aircraft only. It aims to establish a benchmark, assess achievements in aviation safety during the past decade, and determine the direction it should take in the coming years.

Background

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 to assist 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 reviewing the statistics for the past decade, clues must be sought out regarding what should be done. This should be carried into the 2003 review, aiming to offer the industry and IATA in particular something new as to the best way forward.

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. The data used by IATA is obtained from a number of sources and is continually updated. In some cases, this may be reflected in some changes to the total number of accidents from previous reports.

2.1 DATA FOR LAST TEN YEARS (JET)

The air transport industry has shown significant growth on a global scale over the past decade in terms of fleet size and sectors flown. Fatal accidents are always tragic. However, Jet airline travel continues to show a very high level of safety. In the year 2003, Jet Hull Losses demonstrated a significant improvement in comparison with previous years, while the level of activity continues to climb.

Figure 2.1.A
Jet Fleet Size and Sectors Flown 1994-2003

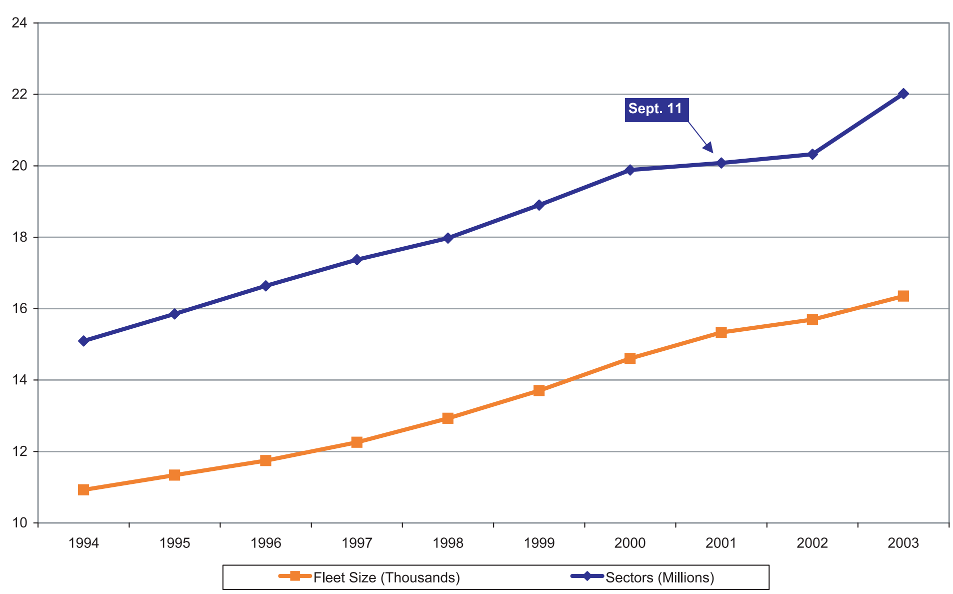
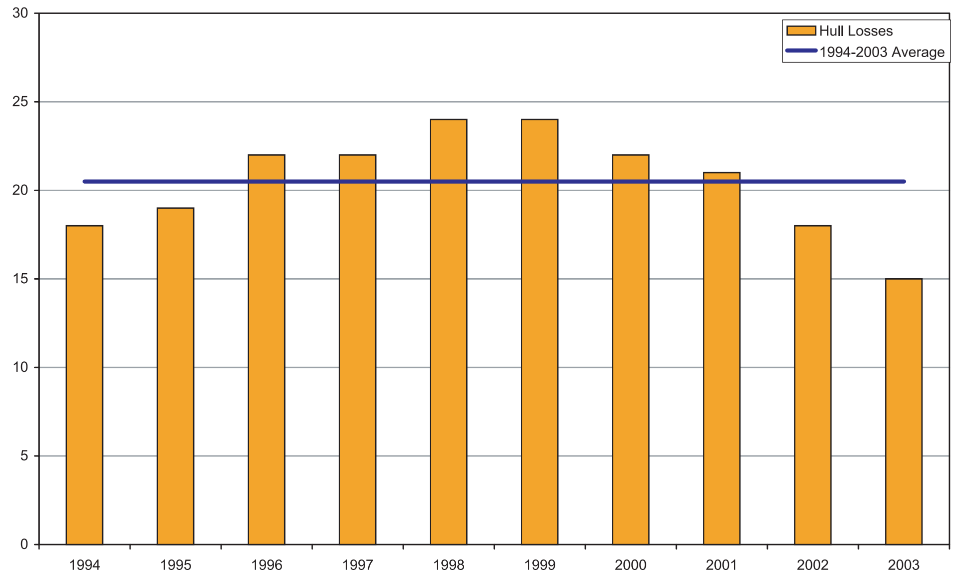


Figure 2.1.B
Jet Hull Losses (1994–2003)



In terms of Western-built Jet Hull Losses, 2003 was the best performance of the decade, with a 26.8% reduction from the ten year average.

Figure 2.1.C
Hull Loss Rate 1994–2003

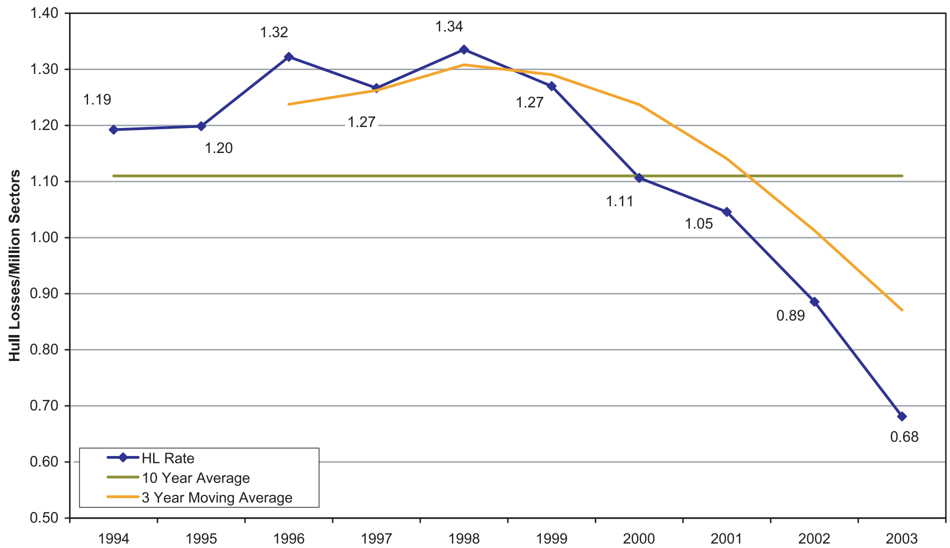
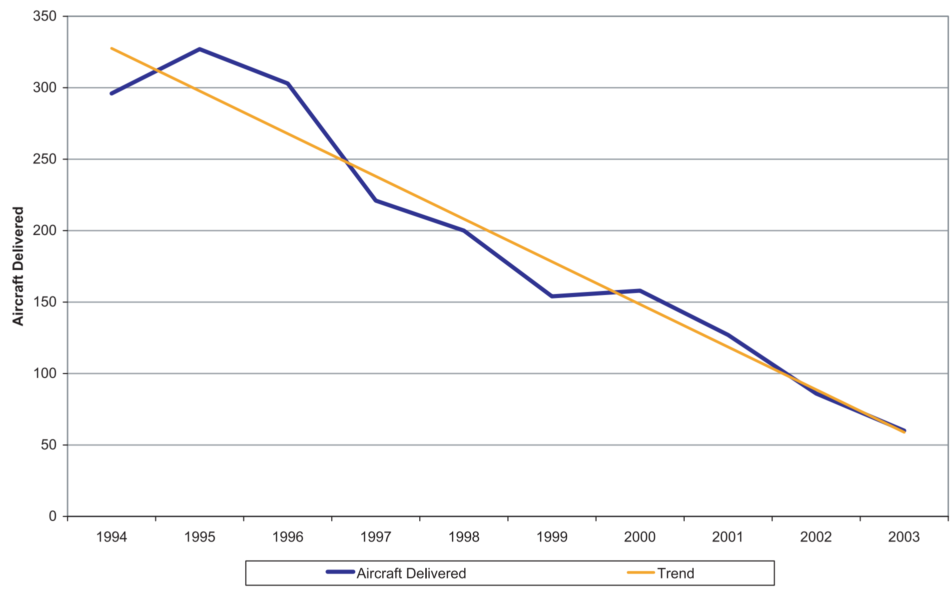


Figure 2.1.C shows the Hull Loss Rate (Hull Losses per Million Sectors), together with the 10-year average and trend line. The Western-built Jet Hull Loss rate showed a remarkable decline, down from 0.89 in 2002 to 0.68.

2.2 DATA FOR LAST TEN YEARS (TURBOPROP)

Western-built Turboprop aircraft make up 23% of the airline fleet. The latest figures show a worldwide fleet just fewer than 5000 aircraft. 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 some cases, regional jets are replacing Turboprop aircraft. However, this only displaces the Turboprop fleet and positions these older aircraft into operators that are upgrading but cannot justify new aircraft.

Figure 2.2.A
Western-built Turboprop Deliveries 1994-2003

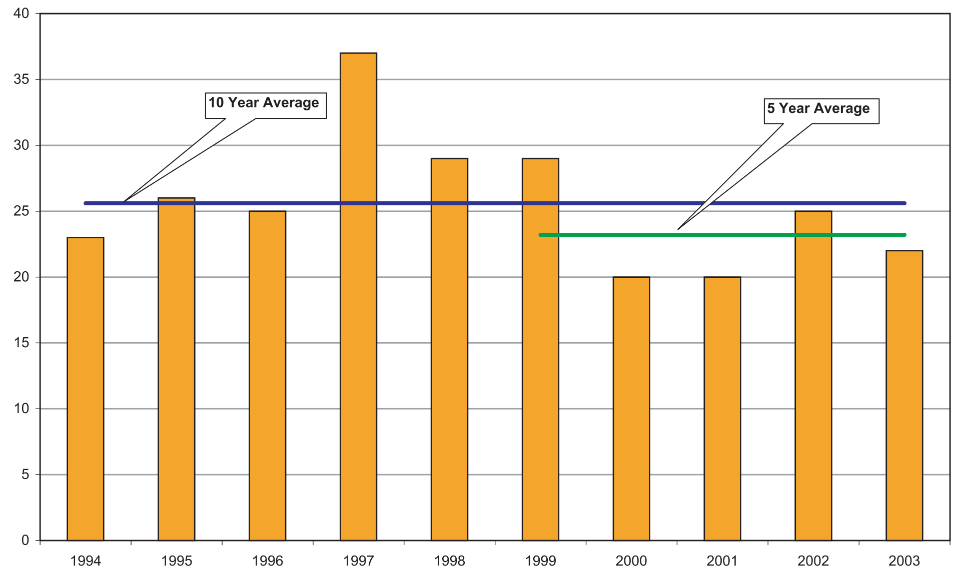


Over the past decade, small regional jet aircraft have replaced many Turboprop operations. This has shown in the marked reduction in the number of Western-built Turboprop aircraft delivered new during this period. At its peak in 1995, 327 aircraft were delivered, however in 2003 only 60 were delivered. As these aircraft get older and are passed on to smaller operators, perhaps in countries or areas where support is difficult, it is clearly a priority to ensure that the level of safety for this type of aircraft is not permitted to decline.

Turboprop aircraft often operate to regional airports, which sometimes lack facilities available at major airports such as infrastructure support in terms of ground handling and air traffic control or radar.

Photo courtesy of Bombardier

Figure 2.2.B
Turboprop Hull Losses (1994–2003)



It is encouraging that the number of Turboprop Hull Losses in 2003 is below the five and ten year averages. However, they constitute approximately one third of the accidents to Western-built aircraft that occurred during the year, despite the fact that Turboprops do not account for a similar proportion of air transport.

Figure 2.2.C
Turboprop Hull Losses per 1000 Aircraft Years

There was a slight reduction in the Turboprop Hull Loss rate for the year 2003 in comparison with the average rate for the past decade which is 4.94 Hull Loss per thousand aircraft years. Turboprop aircraft often operate to regional airports, which sometimes lack facilities available at major airports such as infrastructure support in terms of ground handling and air traffic control or radar. This challenging environment is seen as a contributing factor to the rate over the past ten years.

2.3 REVIEW OF FATAL ACCIDENTS AND FATALITIES — JET & TURBOPROP

This section presents the relationship between accidents and fatalities. The review of the year's accidents showed a continued improvement in all areas.

Figure 2.3.A
Western-built Jet Fatal Accidents and Fatalities

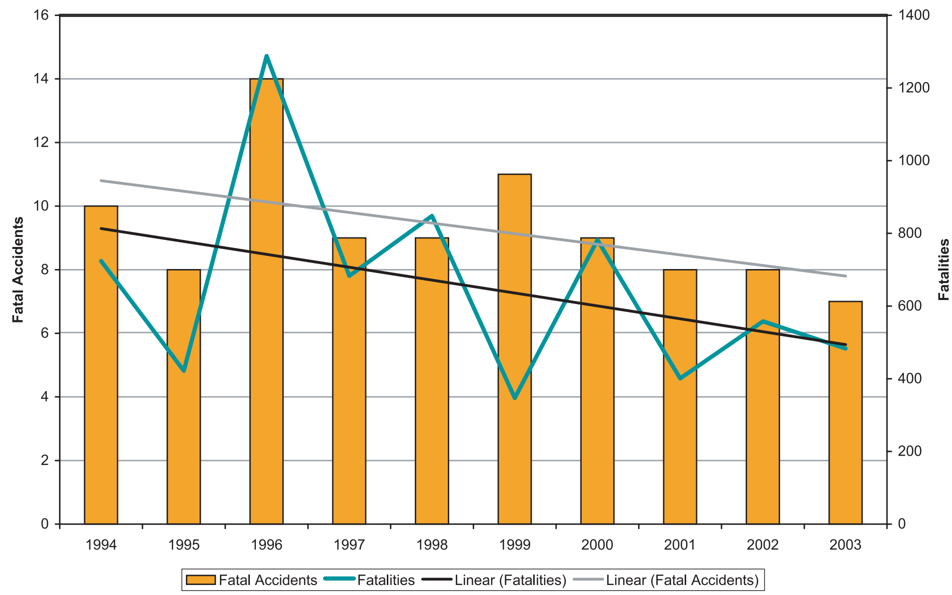
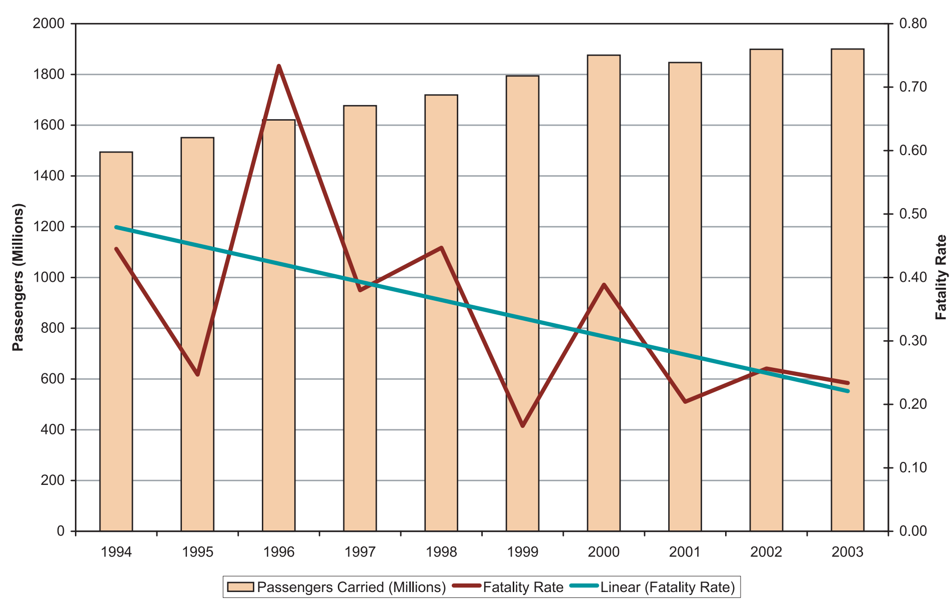


Figure 2.5.A illustrates the constant improvement for accidents and fatalities. In fact, the 7 fatal Western-built Jet accidents in 2003 marks the best performance of the decade.

Figure 2.3.B
Western-built Jet Passengers Carried & Passenger Fatality Rate



The relationship between the increase in passengers carried and the reduction of the fatality rate shown in Figure 2.3.B continued to demonstrate improvement.

Figure 2.3.C
Turboprop Fatal Accidents & Fatalities

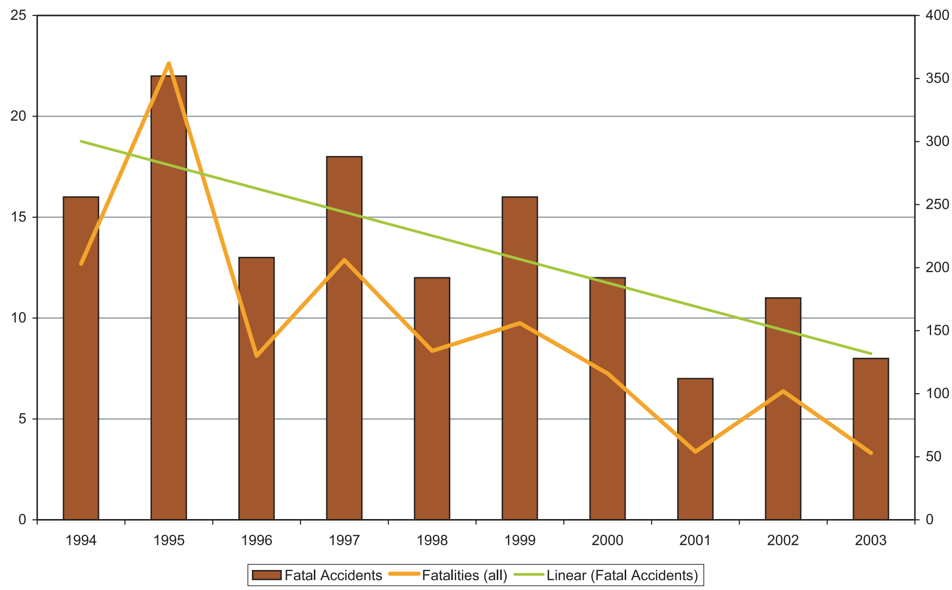


Figure 2.3.C shows that over the decade, the Turboprop fleet has enjoyed a steady decline in the number of fatal accidents up until 2001 when only 7 occurred. This trend was interrupted by the 11 fatal accidents occurring in 2002. The 2003 total of 8 fatal accidents is showing that the previous trend line is continuing which is encouraging, but it also shows that priority must continue to be devoted to promoting safety within the Turboprop fleet, which now has an average age of 18 years compared with 13 years for the Jet Fleet.

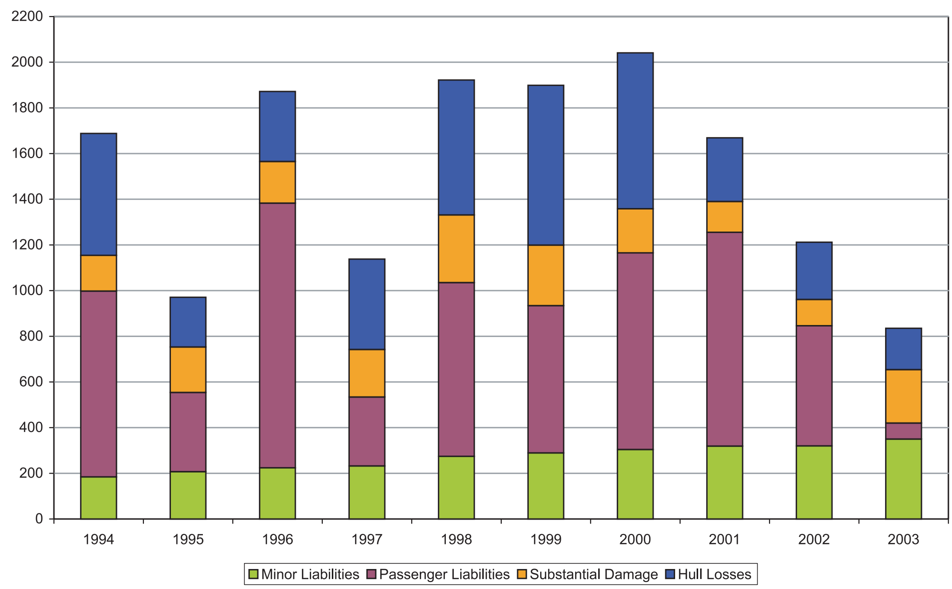
2.4 ACCIDENT COSTS

Western-built Jet

All figures in US$

IATA has obtained the estimated cost for **all losses** involving Western-built Jet airlines over the past decade, excluding acts of violence.

Figure 2.4.A
Jet Accident Costs (1994–2003)



The estimated cost of Hull Losses involving Western-built Jet aircraft over the past decade appears cyclical. However, Figure 2.4.A shows a significant overall reduction in costs during 2003 in comparison to previous years. The reasons for this reduction remain unknown, although they may be partly attributable to the low accident rate for 2003. The cost of accidents for 2003 is detailed in Figure 2.4.B.

Figure 2.4.B
Jet Accident Costs 2003

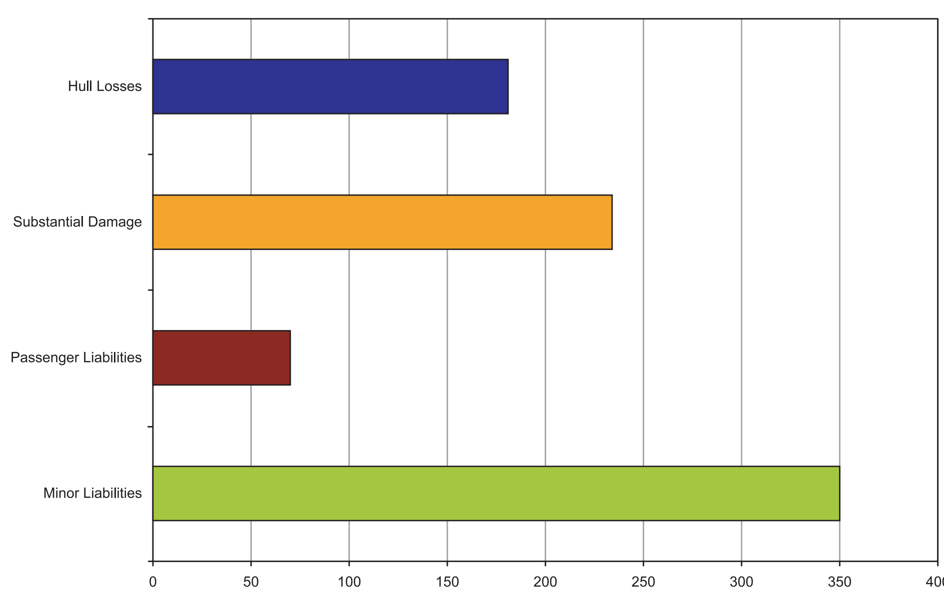
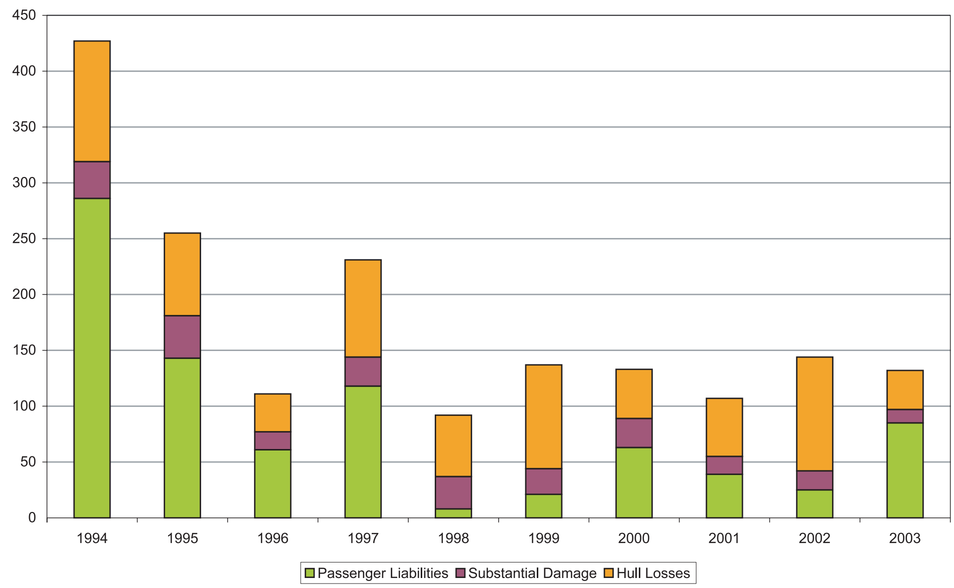
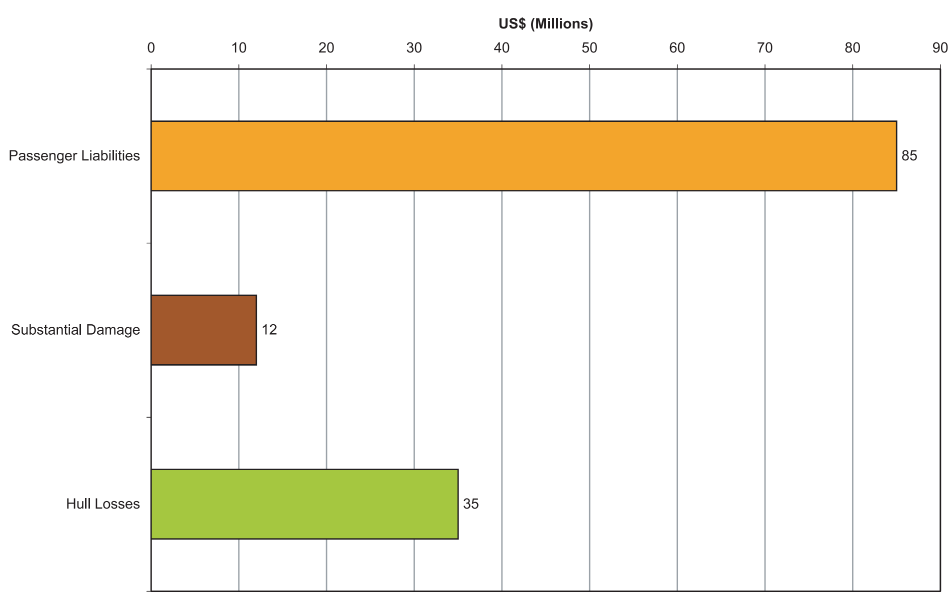


Figure 2.4.C
Turboprop Accident Costs (1994–2003)



During the past decade, costs resulting from Western-built Turboprop aircraft accident dropped about $300M to under $150M, as shown in Figure 2.4.C.

Figure 2.4.D
Turboprop Accident Costs 2003



The total cost of Hull Losses of Western-built Jet and Turboprop aircraft for 2003 is around $216M, which is the lowest of the decade. The ACWG concluded that these costs were in reality five times greater than reflected here, because of the associated commercial impact.

2.5 REFLECTING ON THE DECADE

At the beginning of the decade, IATA committed to an objective of a “reduction of the world accident rate by 50% by the year 2004”. Aviation safety has improved greatly in the last decade. Safe air travel is considered as a given. This is due in part to the considerable efforts made by airlines, regulators, the manufacturers and other stakeholders.

Technological developments, engineering reliability and maintainability, Safety Management Systems (SMS), Human Factors (HF) and risk management have impacted markedly on safety. Logic would suggest that if these were the foundations of the prevention strategies that drove the accident rate down from 1.19 per million departures in 1994 to 0.68 in 2003 then the aviation industry should continue to build upon them. However, as the collective effort to drive the accident rate down continues still further, the possibility exists that doing more of the same, with more intensity, may not turn out to be the best possible course of action. Through its safety successes contemporary aviation has been turned into the first ultra-safe system in the history of industrial systems. An ultra-safe system is defined by experiencing less than one occurrence per million events. For commercial aviation, this translates to less than one accident per million departures.

While it might be difficult to assert what should be done to continue driving the accident rate down in today’s ultra-safe aviation system, it is clear what should not be done: solutions that worked in the past should not be brought forward and updated for the present with an escalated commitment, in the hope that past solutions will generate today the same safety dividends they generated in the past. The Industry certainly needs to continue to build upon the success of technology, Safety Management Systems and Human Factors knowledge, and so forth, but if we are going to reduce the accident rate further, we must think anew.

2.6 CHAPTER 2 SUMMARY

Ten years ago, IATA, through direction from its Board of Governors and Operations Committee, targeted a reduction of the world accident rate by 50% by the year 2004. Now that the industry approaches this target, further reductions will require a review of current safety initiatives and much innovation.

The statistical benchmark of the accidents of the past decade is summarised below.

- The Hull Loss rates and fatality rates for 2003 are among the lowest on record.
- The Hull Losses per million sectors fell by 42.9% over the decade.
- The number of Western-built Jet Hull Losses for 2003 was reduced 26.8% from the ten-year average.
- The year 2003 experienced the lowest number of fatal accidents involving Western-built Jets in the past decade, with 7 accidents recorded.
- The Western-built Jet Hull Loss rate for 2003 was 0.68 Hull Losses per Million Sectors. This shows a continuation of the positive trend observed since 1998, a great improvement.
- The estimated cost of Western-built Jet Hull Losses over the past decade continued to decline from a high of $ 700M in 1999 to less than $ 200M in 2003. This was lowest cost of the decade.
- During 2003, the number of Western-built Turboprop Hull Losses improved, in contrast with the previous year. In total, there were 22 Western-built Turboprop Hull Losses in 2003 in comparison to 25 in 2002 and this was still below the five and ten year averages.
- The ten-year average Western-built Turboprop Hull Loss rate was 4.94 Hull Losses per 1000 aircraft years. For the year 2003, this rate presented a continuing improvement at 4.43.

- Over the past decade, there was a steady reduction in the number of fatal accidents involving Western-built Turboprop aircraft up until 2001 when only 7 occurred. However, in 2002 the number of fatal accidents increased to 12 and in 2003 there were 8. It is encouraging to observe the ten-year trend line reducing despite such spikes.
- Accident costs resulting from Western-built Turboprop operations dropped from their decade high of over $ 400M in 1994 to a plateau of around $ 150M, and 2003 was almost the lowest for the decade.
- The total cost of Hull Losses involving Western-built Jet and Turboprop aircraft for 2003 was around $ 216M. This was the lowest cost during the past decade.

Through its safety successes contemporary aviation has been turned into the first ultra-safe system in the history of industrial systems.

Photo courtesy of Airbus

CHAPTER 3 — YEAR 2003 IN REVIEW

This chapter presents the global accident statistics for 2003. Accidents involving both Western-built and Eastern-built aircraft area analysed in this chapter. However, the analysis primarily focuses on the accidents involving Western-built aircraft.

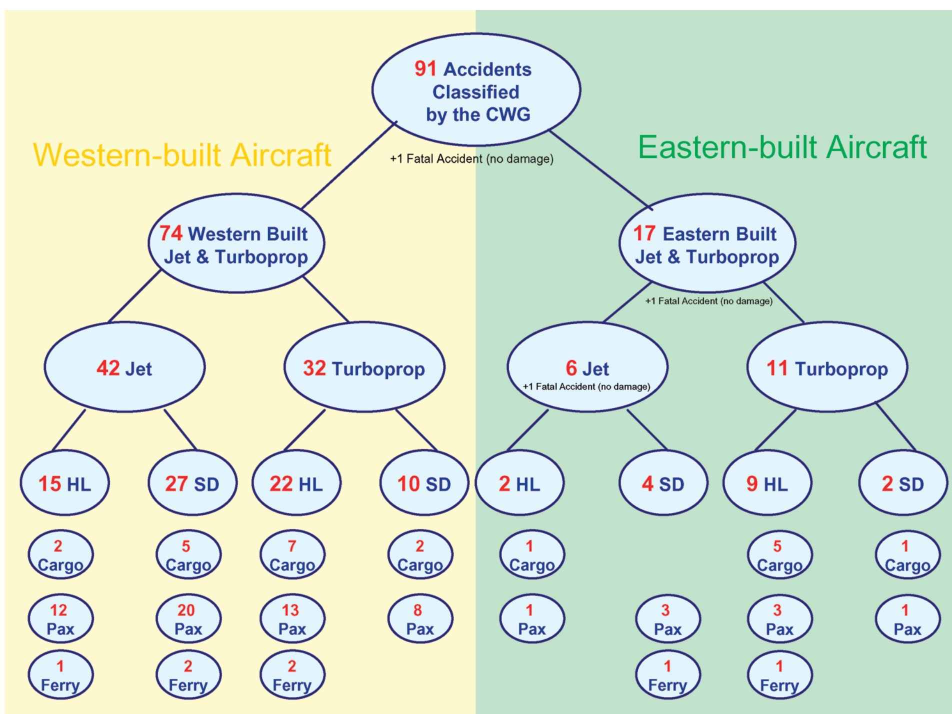
DATA ANALYSIS

Total of Accidents

In 2003, 91 accidents involving Western-built and Eastern-built Jet and Turboprop aircraft were classified. Their distribution is presented in Figure 3.1.A and they are all set out in a summary table at Annex 2.

The primary focus of the Safety Report is the analysis of operational accidents implicating Jet and Turboprop aircraft that resulted in Substantial Damage (SD) or a Hull Loss (HL). Only operational accidents are reviewed in this report. An operational accident is one which occurred during a normal revenue operation or a positioning flight. Therefore, figure 3.1.A excludes ground events where there was no intention of flight and does not encompass deliberate acts of violence.

Figure 3.A
Distribution of 2003 Accidents



3.1 STATISTICS FOR WESTERN-BUILT AIRCRAFT

3.1.1 Western-built Jets

The descriptions of Western-built Jet accidents that resulted in Substantial Damage or a Hull Loss are presented at Appendix D on the CD-ROM and listed in a summary of accidents at Annex 2.

Fleet-Hours-Sectors

World Fleet (end of year):	16,397
Hours Flown:	40.36 million
Sectors (landings):	22.02 million

Despite September 11 and SARS the fleet size-Hours-Sectors continue to increase as noted in Chapter 2, Figure 2.1.A.

Operational Accidents

Hull Losses (HL):	15
Substantial Damage (SD):	27
Total Accidents:	**42**

Loss Rates

Hull losses per million sectors:	0.68
Hull losses per million hours:	0.37

Passengers Carried-Fatal Accidents-Fatalities & Fatality Rate

Passengers carried (million):	1,900
Estimated change since the previous year:	0
Fatal accidents:	7
Fatalities:	
Passenger fatalities on board revenue passenger flights:	447
Passenger fatalities on board cargo flights:	0
Crew:	37
Total:	**484**

Passenger Fatality Rate

0.24 passenger fatalities per million passengers or the equivalent of one passenger fatality per 4.17 million passengers carried on board revenue passenger flights during 2003.

Figure 3.1.A
Fatal vs Non-Fatal Accidents

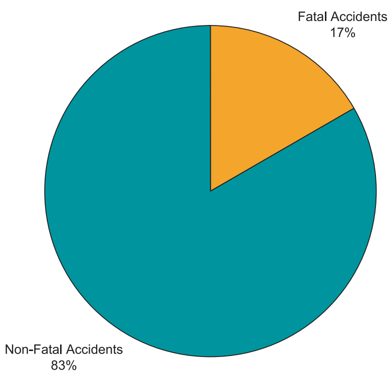
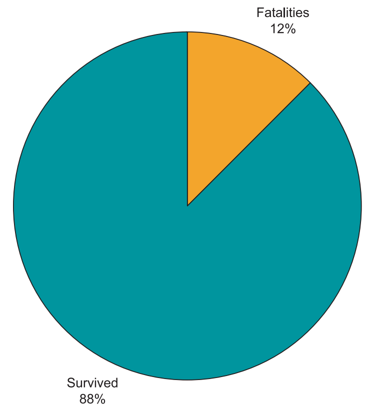


Figure 3.1.B
Accident Survivability



There were 3,882 people (crew and passengers) onboard Western-built Jet aircraft involved in the 42 accidents that occurred in 2003. Overall, 484 occupants suffered fatal injuries, while 3,402 survived. Figure 3.1.B illustrates accident survivability for the year 2003.

3.1.2 Western-built Turboprops

Fleet-Aircraft Years Flown

World Fleet (end of year): 4,955

Aircraft Years flown in 2003: 4,961

Fleet size for Turboprops has continued to decrease over the past 3 years, as has the aircraft years flown. This trend is illustrated in figure 2.2.A, presented in Chapter 2.

Operational Accidents

Hull Losses: 22

Substantial Damage: 10

Total accidents: 32

There were fewer accidents involving Western-built Turboprop aircraft in 2003, in comparison to the previous year. The number of Hull Loss accidents for 2003 was below the five-year average. There was also a slight improvement in contrast with the past decade.

Operational Hull Loss Rates

There is insufficient data to calculate Turboprop operational Hull Loss rates per million sectors or per million hours. Hence, as in previous annual reports, the operational loss rate is expressed per 1000 aircraft-years. (See Appendix C for aircraft-year definition.)

Hull losses per 1000 aircraft-years: 4.43

Fatal Accidents & Fatalities

Fatal accidents: 8

Fatalities:

- Passengers: 40
- Crew: 14
- **Total: 54**

Of the 32 operational accidents (22 HL and 10 SD), 8 (25%) resulted in passenger and/or crew fatalities.

3.1.3 Summary Assessement of Western-built Aircraft

There were 74 accidents involving Western-built Jet and Turboprop aircraft in 2003. This represents a 19.4% increase compared with the 62 accidents that occurred in 2002. There were 11 more accidents involving Western-built Jet in 2003 in comparison to 2002.

In total, 15 accidents involving Western-built Jets resulted in a Hull Loss. In 27 events, the aircraft was Substantially Damaged.

In 2003, 32 accidents involved the Western-built Turboprop aircraft. Overall, 22 Western-built Turboprop accidents resulted in a Hull Loss and 10 aircraft were Substantially Damaged. There was a 3.2% increase in the number of accidents involving Turboprop aircraft, in comparison to the previous year.

Hull Loss Rates

In 2003, the Hull Loss Rate per million sectors for Western-built Jets fell from 0.89 per million sectors in 2002 to 0.68 per million. The rate has been reduced by almost half in contrast to the past decade. The downward trend has been maintained for the past five years.

The Hull Loss rate for Western-built Turboprops, expressed in terms of losses per 1000 aircraft years, decreased slightly in 2003. However, this is a gradual improvement in the Hull Loss rate for Turboprop aircraft in comparison to the past decade.

Fatal Accidents and Fatalities

Among Western-built fleets, there were 7 fatal accidents involving Jet aircraft and 8 fatal accidents involving Turboprop aircraft. These accounted for 484 fatalities on board Jet aircraft and 54 on board Turboprop aircraft.

In terms of fatal accidents, there was very little difference in the number of Western-built Jet occurrences in contrast with 2002. There were 27% fewer fatal accidents among Turboprop aircraft in comparison to the previous year.

Photo courtesy of Boeing

The Western-built Jet Hull Loss rate has been reduced by almost half in contrast to the past decade. The downward trend has been maintained for the past five years.

3.2 STATISTICS FOR EASTERN-BUILT AIRCRAFT

This part of the Safety Report deals with Eastern-built aircraft. These aircraft are manufactured in the former Soviet Union.

Eastern-built Aircraft: The main types of aircraft currently in service and considered in this portion of the IATA Safety Report 2003 are:

Jets: An-72, Il-62, Il-76, Il-86, Tu-134, Tu-154, Yak-40 and Yak-42.

Turboprop: An-12, An-24, An-26, An-28, An-32, L-410 and Y-12.

3.2.1 Eastern-built Jet

Hours and Sectors Flown

Hours and sectors flown are not available for the year 2003 but are estimated to be in the region of 0.8 million hours and 0.4 million sectors (broad estimate):

Operation of Eastern-built Jet aircraft continued to decrease sharply during the past decade. This significantly reduced utilisation would explain, in part, the relatively low number of Hull Losses in comparison with previous years.

Accidents

Hull Losses:	2
Substantial Damage:	4
Total Accidents:	**6**

Fatal Accidents

There were 3 fatal accidents involving Eastern-built Jet aircraft. In total, 19 crewmembers and 76 passengers were killed in the accidents. However, one of these fatal accidents accounting for 14 fatalities sustained no damage to the aircraft, and therefore fell outside the scope of the accidents classified by the ACWG. It is not included in the analysis which follows.

Hull Loss Rate

The operational Hull Loss rate was estimated to be 5 per million sectors and 2.5 per million hours.

3.2.2 Eastern-built Turboprops

Hours and Sectors Flown

No accurate exposure data is available for Eastern-built aircraft. However, broad estimates have been made for passenger aircraft in operation with Commonwealth of Independent States (CIS) airlines as follows:

Figure 3.2.A

	2003	1994-2003
Hours, million	0.4*	5*
Landings, million	0.3	4

*Estimated

Accidents

There were 9 known Hull Loss and 2 known Substantial Damage accidents involving Eastern-built Turboprops.

Fatal Accidents

Three of the 9 operational Hull Loss accidents resulted in fatalities (11 crewmembers and 19 passengers).

Hull Loss Rates

The operational Hull Loss rate for Eastern-built Turboprop is estimated to be 30 per million sectors and 22.5 per million hours.

3.2.3 Summary Assessment of Eastern-built Aircraft

In 2003, There were 17 Eastern-built Jet and Turboprop Hull Loss and Substantial Damage. Operation of Eastern-built Jet and Turboprop aircraft declined considerably during the 1990s. In part, this significantly reduced exposure would explain the relatively low number of accidents in contrast to earlier years.

Two Hull Losses involved Eastern-built Jets in 2003. This is a decline from the 5 Hull Losses reported in the previous year. However, there were 11 Eastern-built Turboprop accidents in 2003 versus the 17 reported in 2002. There were only two Eastern-built Turboprop accidents that resulted in Substantial Damage.

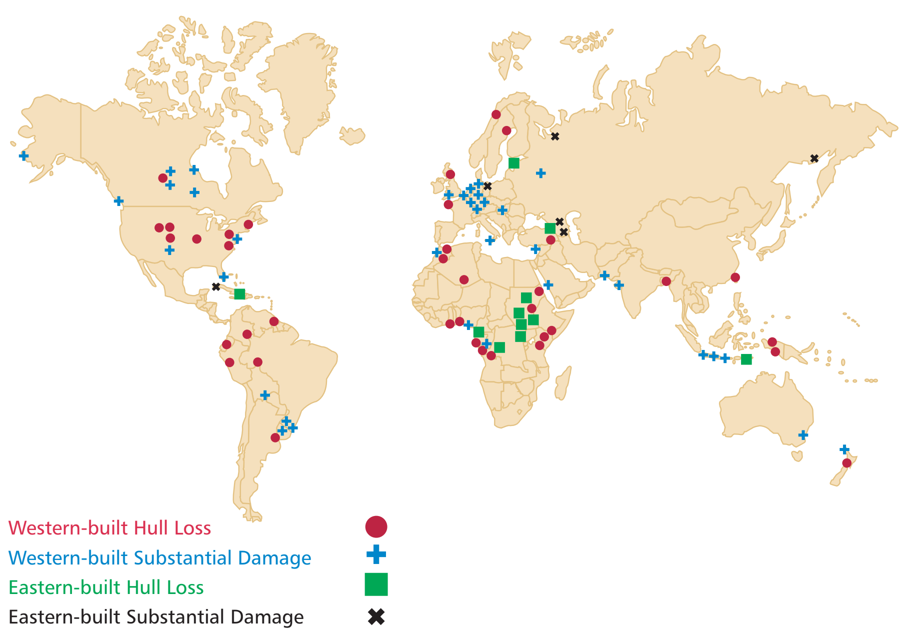
Seven out of the 17 accidents involving Eastern-built Jet and Turboprop aircraft occurred in Africa. Only 5 events occurred inside the boundaries of the former Soviet Union.

3.3 AIRCRAFT ACCIDENTS BY REGION

3.3.1 All Accidents

Figure 3.3.A illustrates the year's accidents by location of occurrence. Clearly, Africa, Europe and South America experienced the greatest concentration.

Figure 3.3.A
2003 Accident Review By Location



Western-built Aircraft Accidents by Region

Hours and flown sectors data is only available for Western-built Jet fleets. Even with this data, some estimations have been made. However, accuracy may be assumed with a 2% margin of error.

The 2003 data for Western-built Jet operation spans 22.02 million sectors broken, down as follows:

- North America (NA) 9.78 Million
- Europe (EU) 5.55 Million
- Far East (FE) 4.03 Million
- South America (SA) 1.54 Million
- Africa (AF) 0.59 Million and
- Near East (NE) 0.53 Million sectors

Sector information for Western-built Turboprops is not available.

Figures 3.3.A, 3.3.B, and 3.3.C present the accidents by IATA region of operator. Figure 3.3.B illustrates the Western-built Jet Hull Loss rate per million sectors and Figure 3.3.C shows the Western-built Turboprop rate expressed as Hull Losses per Thousand Aircraft Years.

Figure 3.3.B
Western-built Jet Hull Loss Rate by Region

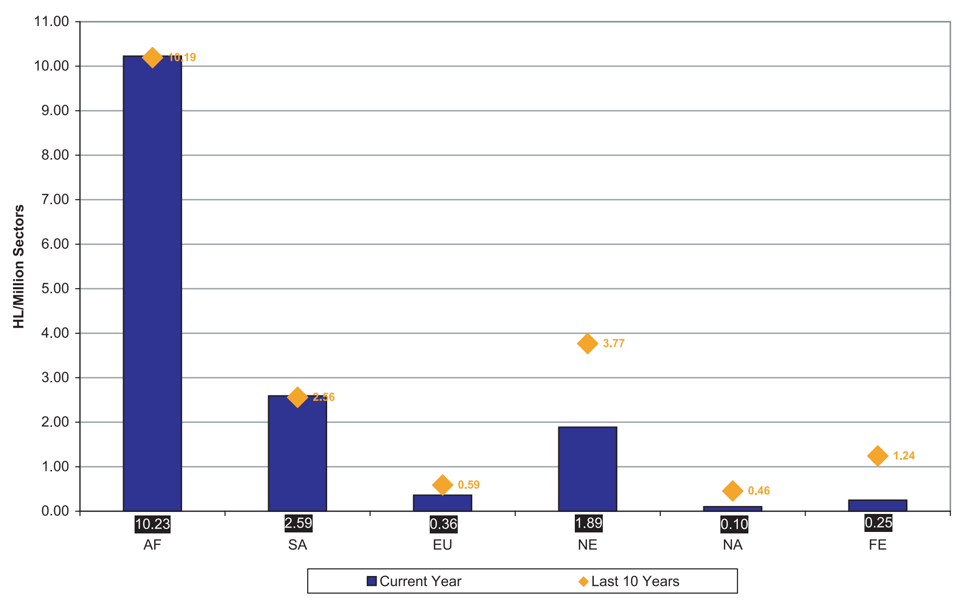
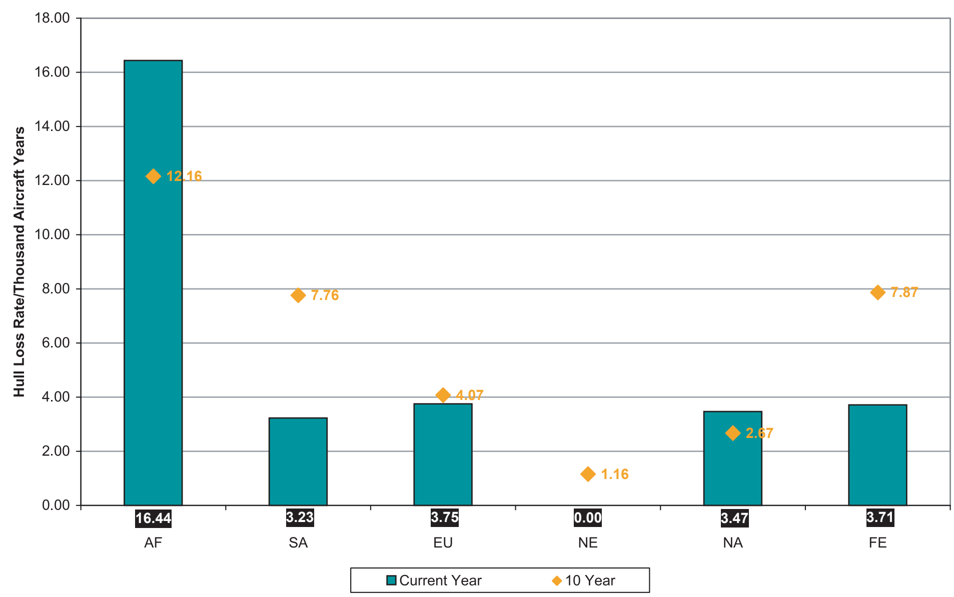


Figure 3.3.C
Western-built Turboprop Hull Loss Rate by Region



Eastern-built Aircraft Accidents By Region

Figure 3.3.D
Eastern-built Aircraft Hull Loss Count by Region

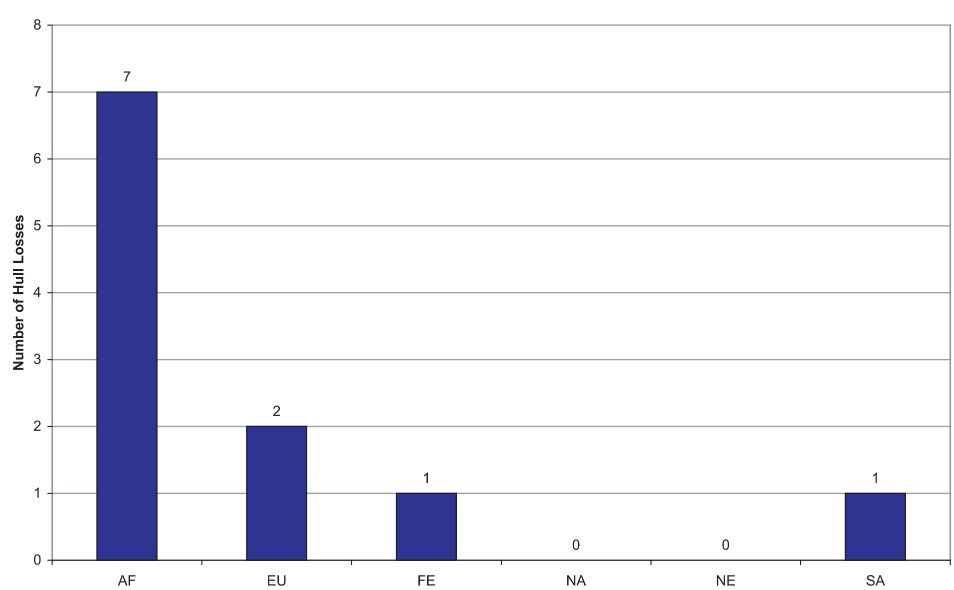


Figure 3.3.D illustrates the Eastern-built aircraft Hull Loss count by region of operator. This data is not rate based. The chart presents the hard count of Hull Losses by Region of Operator.

Review of Accidents by Region

There were no fatal Jet aircraft accidents in the North American (NA) region during 2003. One Jet Hull Loss occurred in NA in 2003; there were no fatalities.

Seven Hull Loss accidents involving Western-built Turboprop aircraft took place in NA during the past year. Two of these occurrences accounted for 23 fatalities. It is worth noting that both of these accidents were to the same aircraft type and were produced in similar circumstances.

The Hull Loss rates in Europe (EU) and the Far East (FE) were low. Eight Hull Losses were linked to 153 fatalities and 6 hull Losses accounted for 13 fatalities respectively.

In the Near East (NE) there were 2 accidents.

In South America (SA) there were 5 accidents with 77 fatalities.

The African region (AFI) had the highest accident rate for 2003. There were 19 Hull Losses, which resulted in 383 fatalities. Of these, 6 Western-built Jet occurrences resulted in a Hull Loss and 3 in Substantial Damage. Overall, 3 of the Jet accidents accounted for 359 fatalities, more than half the world's total number of fatalities for the year.

3.3.2 Regional Safety

Offices in all of the IATA regions continue to monitor issues relating to safety. Refer to Section 5.3 for information regarding regional initiatives related to Air Traffic Control. This year, IATA has taken specific interest in Africa and Latin America.

Focus on Africa

Accounting for a quarter of the year's accidents (23 events) including 7 fatal accidents (33%) that resulted in 397 fatalities (60%), 2003 was the worst year ever in Africa. This contrasts with a remarkable improvement in other type of accidents, namely cargo and Eastern-built aircraft. Overall, the accident rate remained relatively constant.

The improvements observed were as a result of decisive actions by some States, for example Angola, who went as far as grounding certain aircraft types and seriously restricting others. This demonstrates once again the crucial role that regulatory authorities must play in bringing the situation under control.

The lack of resources in operations and maintenance standards are major factors in the poor levels of safety. Data concerning the year's accidents indicated that training and proficiency standards combined with commercial pressures, lack of resources and poor regulatory oversight were contributing factors to the events produced in this region.

Though official accident investigation reports are not yet available, the high level of commercial hull losses appears to point to the need for reinforcement of safety culture within operators, namely maintenance practice and crew training. Two of the major accidents followed loss of control subsequent to one engine failure, in principle survivable incidents. Another apparently was due to aircraft overload of which the crew had been made aware but disregarded.

Infrastructure deficiencies did not appear to have played a major role in any of the accidents in 2003. This would confirm that operator-related factors are more significant than any others, including infrastructure. Contributing to the safety infrastructure issues however are poor pay for civil aviation staff, and inadequate training and standards, particularly in countries undergoing civil strife. Aircraft are often registered in countries of convenience where operational and maintenance oversight is minimal or non-existent. Many countries have only a very small number of transport category aircraft on their register and perhaps lack the specialist ability to monitor their operation and safety standards.

Training: With a view to instil a better safety culture, adequate training at all levels of management and operations is indispensable. Towards this objective, IATA has launched a major regional training initiative with member airlines. IATA has also been actively involved in the training of staff of air navigation personnel, having established partnership with several air navigation service providers and regional training institutions. The extension of these initiatives should be expanded to other operators and partners.

Following training, a system of controlling procedures and identifying weaknesses is necessary. It is IATA's view that IOSA provides the adequate tool to address this. In addition to promoting IOSA with IATA members, IATA should also be enlisting the support of specific States for the extension of IOSA to other air transport operators.

Air Traffic Services (ATS): IATA Africa ATS Incidents Working Group has been operational for last six years. To address ATS areas of concerns, IATA ensures the follow-up of recommendations formulated by the regional group composed of concerned stakeholders. The group will assess the 2003 reported ATS incidents by April 2004. Some deficiencies have already been identified and IATA is engaged in co-operation with the States involved and ASECNA to deal with the situation. A good achievement to be noted in 2003 is an improvement in the extension of VHF coverage in Sudan.

African and Indian Ocean Safety Enhancement Team (ASET): Reducing the accident rate in Africa must now be subject of a concerted effort on the part of airlines, regulators and international organisations. This is a main driver behind the IATA led establishment of the ASET with a view to correctly identify causes and trends and to actively promote corrective actions. ASET brings together regulatory authorities, air navigation providers, airport operators, airlines and aircraft manufacturers. Following its launching in December 2003, ASET is now developing a work plan with a view to promote corrective actions with all partners.

There is reason to believe that the initiatives being put in place in the Region will result in a substantive improvement in the level of safety in Africa regional operations.

Prevention Strategy:

1. *The Safety Committee (SAC) to establish a Task Force to influence, in both established and innovative ways, the role of governments, regulators and air carriers in safety management. IATA will enlist the support of member airlines that operate in and into Africa.*

South America and Caribbean

Latin America and Caribbean are vast and heterogeneous regions with various climates, high topography with some unsurveyed areas, high elevation airports and large unpopulated areas with major airports dispersed.

The regional economical conditions have hampered the implementation of appropriate safety measures not only by the States but also the operators. This is reflected in the infrastructure, the diversity of fleets as well as the equipment onboard aircraft.

Traditionally in several States in the region, the Civil Aviation Authority has been controlled by the Air Force. There is a need for the evolution into an independent system managed entirely by civilians that are less bureaucratic and more result oriented to serve the Industry.

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 to Category 2 many States in the region, which imposes economical and operational consequences for them and their own carriers. Emphasis should be placed on training of the personnel involved in the aviation activity such as flight crew, flight operations officers, air traffic controllers, and mechanics. Flight crew limitations, inspection and certification of operators, concessionaires and repair stations, investigation of incidents and accidents and tracking of aircraft spare parts.

In the infrastructure area, there are still some deficiencies such as the lack of radar coverage, poor communications, NavAid reliability, outdated terminal instrumental procedures, lack of WGS-84 coordinates compliance, AIS and Meteorological information not published in a timely and accurate manner, poorly equipped Search and Rescue, and airports with glamorous passenger terminals due to privatisation or concession, but the airside areas achieving only marginal standards and condition. Such safety deficiencies are largely caused by the lack of funding, even though airlines are charged heavily for over flights, landing fees and taxes.

Incidents and accidents such as Airprox, Control Flight Into Terrain (CFIT), mechanical failures, etc. persist in the region in the general aviation, military and commercial sector. Only an ongoing and coordinated effort of the regulators, operators, associations and the industry in general would contribute to diminish the infamous accident rate in the region.

One major regional challenge is to develop a safety culture within the regulators and operators. This may be accomplished by launching a regional awareness campaign led by IATA and channelled through the Pan American Aviation Safety Team (PAAST).

Pan American Safety Team (PAAST): Established in 2000 with support and participation of a number of industry organisations and the IATA Safety, Operations and Infrastructure department (SO&I) in Latin America and the Caribbean (Latam/Car), its mission is to provide leadership and assistance to the regional aviation community. The team reviews current regional safety programmes, being an effective mechanism for promoting them on behalf of its members. In 2003 the PAAST programme was reviewed. It now focusses on three main safety programmes: Approach and Landing Accident Reduction (ALAR), Runway Incursions Prevention Programme (FAA-IATA-ACI RIPP) and PAAST Airline Self Evaluation Checklist (ASEC).

FAA-IATA-ACI Runway Incursions Prevention Programme (RIPP): The FAA, ACI and IATA in an ongoing and successful partnership programme, have devoted considerable effort to the runway safety issue. The goal of the programme is to involve the operators, international aviation organisations and industry in safe airport operations, and connect with the European Runway Incursion Prevention Programme.

ICAO GREPECAS Aviation Safety Board: Established in 2000, it provides a forum where the deficiencies in the Air Navigation Plan, characterised as safety impairments, can be identified for immediate State resolution. ICAO, IFALPA, IFATCA and IATA participate in the board.

IATA LATAM/CAR ATS/AIRPROX Review Group: The Group was established by request of IATA Regional Coordination Group (RCG) 15 and met in the fourth quarter of 2003. The group presented a preliminary analysis of Air Traffic Incidents and Airprox to RCG16. The main findings were: a lack of participation of regional carriers, inadequate investigation by the Civil Aviation Authorities and non-standardise reporting system by airlines. The Group concluded that it would review and present an analysis of the year 2003 and 2004 in terms of ATS/Airprox incidents and use this as a basis for further action.

3.4 AIR CARGO OPERATIONS 2003 (DEDICATED FREIGHTER AIRCRAFT)

Figure 3.4.A

Cargo vs Passenger Operations for Western-built Jets

	Fleet End of 2003	HL	HL per 1000 Aircraft	SD	Total	Operational Accidents per 1000 Aircraft
Cargo	1,686	3	1.78	6	9	5.34
Passenger	14,711	12	0.816	21	33	2.24
Total	**16,397**	**15**	**0.915**	**27**	**42**	**2.56**

Figure 3.4.B

Cargo vs Passenger Operations for Western-built Turboprops

	Fleet End of 2003	HL	HL per 1000 Aircraft	SD	Total	Operational Accidents per 1000 Aircraft
Cargo	819	7	8.55	2	9	10.99
Passenger	4,136	15	3.63	8	23	5.56
Total	**4,955**	**22**	**4.44**	**10**	**32**	**6.46**

The world's Jet cargo fleet size remained relatively constant from 1,690 in 2002 to 1,686 in 2003. There were 23 accidents involving Eastern and Western-built cargo aircraft, representing 25% of all the year's accidents. About one-fifth (21.6%) of accidents involving Western-built aircraft occurred while conducting cargo operations. There were 7 cargo accidents involving Eastern-built aircraft in 2003. These accounted for 41% of all the events implicating Eastern-built aircraft. A detailed analysis of the contributing factors associated with freighter aircraft occurrences is presented in chapter 4.

About one-fifth (21.6%) of accidents involving Western-built aircraft occurred while conducting cargo operations.

3.5 FERRY FLIGHTS 2003

A total of 7 accidents occurred while ferrying aircraft in 2003. This represents 7.7% of all accidents and is an improvement over 2002. When analysed further, 6.8% of Western-built aircraft accidents and 11.8% of Eastern-built accidents were ferry flights.

A total of 4 ferry accidents happened to passenger aircraft, 2 Western-built Turboprops (both Hull Losses), 1 Western-built Jet (SD) and 1 Eastern-built Jet (SD). There was a total of 3 accidents that occurred while ferrying cargo aircraft. Two Western-built aircraft (1 HL and 1 SD) and 1 Eastern-built aircraft (Hull Loss) were involved. These ferry accidents accounted for 11.5% of all cargo operations during 2003.

3.6 CHAPTER 3 SUMMARY

- In 2003, the Hull Loss Rate per million sectors for Western-built Jets fell from 0.89 per million sectors in 2002 to 0.68 per million. The rate has been reduced by almost half in contrast to the past decade.
- Among Western-built fleets, there were 7 fatal accidents involving Jet aircraft and 8 fatal accidents involving Turboprop aircraft. These accounted for 484 fatalities on board Jet aircraft and 54 on board Turboprop aircraft.
- There were 17 Eastern-built Jet and Turboprop Hull Loss and Substantial Damage.
- Seven out of the 17 accidents involving Eastern-built Jet and Turboprop aircraft occurred in Africa. Only 5 events occurred inside the boundaries of the former Soviet Union.
- There were no fatal Jet aircraft accidents in the North American (NA) region during 2003. One Jet Hull Loss occurred in NA in 2003; there were no fatalities.
- Accounting for a quarter of the year's accidents (23 events) including 7 fatal accidents (33%) that resulted in 397 fatalities (60%),
- IATA led establishment of the ASET with a view to correctly identify causes and trends and to actively promote corrective actions.
- There were 23 accidents involving Eastern and Western-built cargo aircraft, representing 25% of all the year's accidents.
- A total of 7 accidents occurred while ferrying aircraft in 2003.

CHAPTER 4 — ACCIDENT ANALYSIS 2003

4.1 DATA COLLECTION AND CLASSIFICATION

IATA gathers preliminary accident information from official sources. The Accident Classification Working Group (ACWG) then meets to discuss the operational accidents occurring in a single year and classify them. IATA has developed the contributory factor system in order to permit the classification of accidents based on the information available at the time of the meeting. The contributory factors are grouped into five general categories: human factors, organisational factors, technical factors and environmental factors. Each category is then subdivided, which allows for a more concise classification of events. Accidents are generally the result of a combination of factors and therefore one accident may be classified under several categories.

The assignment of these classifications is a subjective assessment of the contributing factors believed to have played a role in the accident. The early classification of accidents, prior to the execution of in-depth investigations, may help identify emerging threats in the aviation industry and aid in the development of prevention strategies and recommendations. However, information concerning certain accidents may be insufficient, therefore, contributing factors for these accidents cannot be assessed. Accidents lacking sufficient information for adequate classification are assigned to the “insufficient data” classification.

Obtaining information about accidents so early in the year can be very challenging, and there are a number of factors involved. The 2002 Safety Report highlighted at least 4 accidents where poor serviceability of Digital Flight Data Recorders and Cockpit Voice Recorders hampered the investigation efforts. This remains a concern for 2003. However, it is not only poor serviceability of the DFDR and CVR that can impede deriving lessons learned. For instance, 1 accident in 2003 raised a concern regarding the practice of not wearing headsets. Although this was not a contributing factor to the accident, the recovery of data from the CVR was significantly more difficult because headsets were not in use and the cockpit area microphone picked up considerable background noise.

Furthermore, much of the data used to classify accidents is obtained from industry and public sources, however the ACWG is concerned that the safety and reporting culture, particularly in certain areas of the world, continues to be deficient or non-existent. In some instances the only public record of accidents is found in media reports. **Deficient incident and accident reporting and occurrence investigation are prevalent in areas where the regulator does not provide the necessary safety oversight for effective non-punitive safety management.** This impedes the process of classifying accidents and thus the development of prevention strategies.

<u>*Prevention Strategy*</u>:

2. *IATA will continue to highlight the need to have Safety Management Systems in place that encourage open reporting in a non-punitive environment.*

4.1.1 Changes in the Contributing Factor Codes

The classifications presented in this chapter are a subjective assessment based on limited information available, this year there are also a number of changes to the definitions of the organisational and human factors categories. Therefore any comparison of the contributing factor data from one year to another must be exercised with great caution.

4.1.2 New Organisational Factor Codes

It was determined that an update of the organisational factors was necessary in order to facilitate the development of prevention strategies and make the Safety Report more meaningful and relevant for safety managers. The new organisational factor codes are presented in Figure 4.1.A. In the analysis of this year’s accidents the reader will observe a greater number and percentage of the contributing factors attributed to organisational factors. This is mainly due to the fact that the codes are now easier to use and not necessarily because organisational factors are seen as a greater threat this year.

Figure 4.1.A
New Organisational Factor Codes

Code	Description	Example Events
O1	Safety management	Inadequate or absent: (1) safety data collection and analysis systems; (2) voluntary confidential reporting systems; (3) safety information communication and feedback tools;
O2	Training	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, Checking and Auditing	Inadequate, incorrect, unclear or absent: (1) Standard Operating Procedures (SOPs); (2) operational instructions and /or policies; (3) company regulations; (4) controls to verify assessment of threats and/or compliance with regulations and SOPs;
O4	Communications	Structured channels of communications are absent, unused or functioning inadequately. Necessary information is not transmitted, is misinterpreted, or arrives too late.
O5	Technology and Equipment	Available safety equipment not installed. (EGPWS, predictive windshear, TCAS/ ACAS, etc.).
O6	Operational planning and scheduling	Crew rostering and staffing practices; flight and duty time limitations; health and welfare issues
O7	Change Management	Inadequate oversight of change. Failure to address operational needs created by, for example expansion, or downsizing. Failure to evaluate, integrate and/ or monitor changes to established organisational practices or procedures. Consequences of mergers and acquisitions.
O8	Selection systems	Inadequate or absent selection standards
O9	Managerial environment	Management activities relating to, for example maintenance, cabin safety, dispatch, ramp, etc.
O10	Other	

4.1.3 IATA's 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) model to allow for a conceptual framework with which to interpret data obtained from both normal and abnormal operations. IATA and its Human Factors Working Group (HFWG) have worked closely with The University of Texas at Austin Human Factors Research team, ICAO and the Line Operations Safety Audit (LOSA) Advisory Board (LAB) to apply TEM to IATA's safety activities.

Figure 4.1.B
Threat and Error Management (TEM) Model

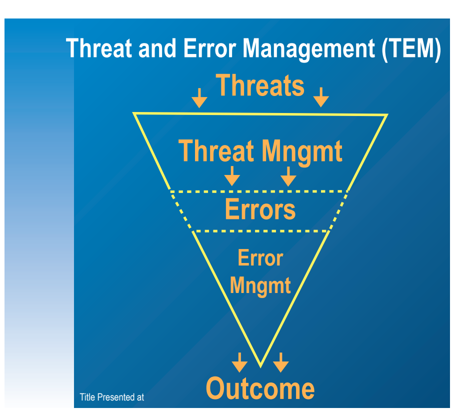


Figure 4.1.B is a simplified version of the University of Texas TEM Model and shows the relationship between threats and errors. Threats are a measure of operational complexity, which means that high threat environments may lead to increased errors. However, there is not a direct link between threats and errors, meaning that errors are not always precipitated by a threat and likewise, mismanaged threats do not necessarily lead to errors.

The TEM framework helps to underline the classification system used by IATA's ACWG to determine factors, which contributed to an accident. Contributing factors in accidents can be viewed as threats or as errors depending on their nature.

Threats are situations external to the flight deck that must be managed by flight crew during normal, everyday operations. These threats increase the operational complexity of flight and pose a safety risk to the flight at some level. Threats can be subdivided into expected and unexpected threats.

Foreseen adverse weather can be an expected threat; a landing gear malfunction can be an unexpected one. Thus, environmental, organisational and technical factors are considered threats because they occur outside the flight deck; they increase the operational complexity and must be dealt with by the flight crew.

The human factors category, on the other hand, defines errors produced by the flight crew. An error is defined as an *action* or *inaction* by the flight crew, which leads to deviations from organisational or flight crew intentions or expectations. Errors in the operational context tend to reduce the margin of safety and increase the probability of accidents or incidents. Previously, this category was subdivided into four classifications: active failure, passive failure, proficiency/skill failure and pilot incapacitation. Active failures comprised both deliberate violations an unintentional deviations in the execution of SOPs. Passive failures included communication breakdowns, forgetfulness on the flight crew's behalf and fatigue. Proficiency and skill failures were composed of inappropriate handling of aircraft systems, incorrect decisions, and lack of experience or of competency. Pilot incapacitation was the last subdivision in the human factors category.

IATA's system for assigning contributing human factors in accidents has been restructured for this year's classification and is based on the TEM model. In collaboration with the HFWG, the new subcategories are believed to assess pilot performance better and to allow a deeper understanding of the human elements that contribute to an accident. The human factors category is now subdivided into six subcategories: intentional non-compliance errors, proficiency errors, operational decision errors, communication errors, procedural errors and pilot incapacitation. The definitions of the new human factors categories are presented in Figure 4.1.C.

Figure 4.1.C
New Human Factors Category

Code	Description	Example Events
H1	Intentional non-compliance	Deliberate deviation from operator procedures and/or regulations. Examples may include performing checklists from memory or intentional disregard of operational limitations or SOPs.
H2	Proficiency	Performance failures due to deficient knowledge or skills. This may be exacerbated by lack of experience, knowledge or training. Examples may 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	Operational decision	A course of action by the flight crew that compromises safety. This category may typically include the following: (1), the flight crew had options within operational reason and **decided** not to take them. (2), the flight crew had time but did not use it effectively to reach or modify a decision. Examples may include a decision to fly an approach through known wind shear instead of going around, or to depart when the departure path will obviously lead through severe weather.
H4	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). Examples may include misunderstanding an altitude clearance, failure to convey relevant operational information.
H5	Procedural	Unintentional deviation in the execution of operator procedures and/or regulations. The intention is correct but the execution is flawed. It may also include situations where flight crews forget or omit relevant appropriate action. Examples may 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.
H6	Incapacitation	Flight crewmember unable to perform duties due to physical or psychological impairment.

When interpreting the information in this chapter, the reader should be mindful that an error that seldom occurs is perhaps indicative of a problem with an individual. However, this is a rare instance and would be linked with an organisational coding of "selection systems". No accident was coded this way for 2003. What is more often seen is that many of the errors presented in the human factors section occur at a frequency that suggests that there is an underlying factor inherent in the environment that induces or provokes these errors. Therefore by identifying errors it must be made clear that this is not to apportion blame. The focus is on the factors that induce errors rather than on the individuals who commit them. For example, is a proficiency error due to lack or improper training? Is a deviation from SOP's due to inadequate SOP's?

4.1.4 Accident Data and Contributory Factors Analysis

Threat management can alleviate an undesired situation and render a 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 safety is unnecessarily compromised by the flight crew's actions or inactions. However, not all threats or errors set off a chain reaction resulting in an accident.

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. By identifying operational threats and errors involved in accidents early on, countermeasures and prevention strategies can be developed to help reduce the accident rate further.

The following section presents the breakdown of contributing factors cited in the accidents produced during the year 2003, involving Western-built Jet and Turboprop aircraft. Section 4.3 presents the analysis of contributing factors for Eastern-built Jet and Turboprop aircraft.

4.2 CLASSIFICATIONS FOR WESTERN-BUILT AIRCRAFT

4.2.1 2003 Events

- There were 74 accidents involving Western-built Aircraft in 2003. Jet aircraft were involved in 42 events, which accounted for 57% of the total number of Western-built aircraft accidents.
- Half of the Western-built aircraft events (37 accidents) resulted in Hull Losses.
- Overall, 56 accidents involved passenger flights; 27 of these events resulted in a Hull Loss.
- 41% (15 cases) of Western-built Jet accidents resulted in a Hull Loss.
- 59% (22 cases) of all the Western-built Turboprop accidents resulted in a Hull Loss.
- There were 27 runway excursions involving Western-built aircraft.
- Eight events involved a loss of control in-flight.
- Six CFIT accidents were produced during 2003 involving Western-built aircraft.

4.2.2 Contributory Factors

The results of the classifications for the Western-built Jet and Turboprop accidents that occurred in 2003 are presented in Figure 4.2.A.

Figure 4.2.A

Contributory Factors for Western-built Jet and Turboprop Aircraft

Contributory Factors			HUM		TEC		ENV		ORG		I
Human Factors	**HUM**	**105**	H1 — Active Failure	10	T1	2	E1	28	O1	18	
Technical	**TEC**	**27**	H2 — Passive Failure	38	T2	5	E2	4	O2	28	
Environmental	**ENV**	**78**	H3 — Proficiency/Skill Failure	31	T3	5	E3	2	O3	34	
Organisational	**ORG**	**111**	H4 — Incapacitation	13	T4	4	E4	1	O4	6	
Insufficient Data	**I**	**7**	H5	13	T5	0	E5	12	O5	5	
			H6	0	T6	1	E6	3	O6	5	
					T7	6	E7	4	O7	2	
					T8	0	E8	0	O8	1	
					T9	2	E9	0	O9	0	
					T10	1	E10	1	O10	0	
					T11	1	E11	23			
					T12	0					
	Total	**328**		**105**		**27**		**78**		**111**	**7**

Figure 4.2.B illustrates the relationship between the contributing factors that were associated with the 42 events involving Western-built Jet aircraft. **Human Factors was the most frequently cited category, accounting for 36% of all contributing factors. Human factors were associated with 30 out of the 42 Western-built Jet accidents. Two accidents were linked exclusively to human factors.** Organisational factors were second, with 35% followed by environmental factors, which made up almost a quarter (24%) of all contributing factors in Western-built Jet accidents. However, technical factors were only associated with 4% of all the contributing factors in Western-built Jet aircraft accidents.

Figure 4.2.B

Contributory Factors for Western-built Jet

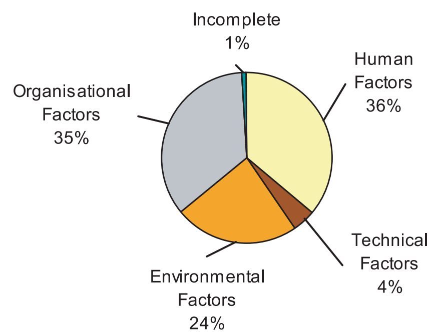


Figure 4.2.C

Contributory Factors for Western-built Turboprop

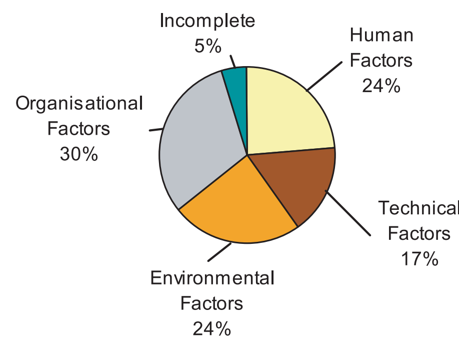


Figure 4.2.C illustrates the contributing factors attributed to the 32 Western-built Turboprop accidents of 2003. Analysis of contributing factors demonstrated that organisational factors were highlighted as the main type of contributors. Human and environmental factors were equally noted in second place, followed by technical factors, which participated in 17% of all the contributing factors in Western-built Turboprop accidents.

4.2.3 Organisational Factors

Organisational factors relate to the corporate environment in which a flight crew operates. This includes administrative aspects, organisational culture, and managerial aspects within the corporation.

Organisational factors were the most frequently identified type of contributing factor associated with Western-built Turboprop accidents in 2003. This may reflect the fact that the organisational codes in the classification system are now easier to use and not necessarily because organisational factors are seen as a greater threat this year. For Western-built Jets, organisational factors were the second most often cited contributing factor. Deficiencies in SOPs, organisational policies, regulations and auditing were noted as the main organisational factors contributing to the accidents involving both Jet and Turboprop operations. Further breakdown demonstrated that training was the second largest organisational contributor in both Turboprop and Jet accidents.

Poor Safety Management Systems ranked third for Jet aircraft operations. This indicates inadequate or lack of data collection and analyses systems, voluntary confidential reporting or safety information communication and feedback within the organisation. In comparison, managerial environment deficiencies were cited in third place among the organisational contributors for Turboprop aircraft accidents. Deficiencies in management activities relating to maintenance, cabin safety, dispatch or airside activities were listed in this category. This confirms the need for IATA to maintain its focus on implementing not only its own Safety Management Support System (SMSS) but also to support the propagation of SMS among the airline community.

4.2.4 Human Factors

This category focuses on human error and the performance of the flight crew involved in an accident. The flight crew works with other components of the aviation system. Technical, environmental or operational factors may interact with human factors and result in a system breakdown, which may produce an accident. Overall, human factors were present in 59% of the years' accidents (44 cases) for both Western-built Turboprop and Jet aircraft accidents combined. However, distinct analysis of Turboprop and Jet Aircraft accidents indicated that human factors were cited more often as contributing factors in Jet accidents versus Turboprops. **Human factors were associated with 71% of all the accidents (30 cases) that involved Western-built Jets. In contrast, 44% of Western-built Turboprop accidents (14 cases) featured human factors.** Only two events that involved Western-built Jet aircraft were solely attributed to human factors. For Western-built Turboprops events, no accident was solely attributed to human error.

Proficiency issues and operational decisions were the two most frequently cited human factors contributing to both Western-built Turboprop and Jet accidents for the year. The first category involved performance failures due to inadequate knowledge, skills or training. Operational decision errors were produced when the flight crew opted for a course of action that unnecessarily compromised safety. This is discussed in detail in section 4.6.3.

For Jet aircraft, the third most frequently noted contributing factor in this category was inadequate communication. This includes but is not limited to communications within the flight crew. Miscommunication with external agents, such as ATC or ground crew is also included in this category. In contrast, procedural errors were the third most frequently cited human factor for Turboprop aircraft accidents. This category is composed of unintentional deviations during the execution of SOPs or regulations. The notable amount of contributing human factors reflects the need for IATA to continue its HFWG activities.

4.2.5 Environmental Factors

This category is comprised of the physical world in which the involved aircraft operated as well as the infrastructure, outside the corporation, required for successful performance. For both Western-built Turboprop and Jet accidents, environmental factors made up 24% of all contributing factors. For both types of aircraft operations, weather was the prevalent environmental factor. Windshear, poor visibility, poor runway condition reporting and turbulence, were among the types of contributing factors noted in this category. **In total, 38% of accidents (28 cases) involving Western-built aircraft occurred in poor weather. Over half of these accidents (54%) resulted in a Hull Loss. The majority of accidents that occurred in poor weather (71%) were linked to Western-built Jet aircraft.**

Regulatory oversight was highlighted in both Jet and Turboprop accidents as the second most frequent environmental contributor. Deficiencies in regulatory oversight were cited in 23 accidents. In 65% of these occurrences (15 cases), the accident resulted in a Hull Loss. In over half of these events (56%), poor regulatory oversight was combined with deficient safety management. Operators from Africa were involved in 43% (10 events) of the accidents citing poor regulatory oversight. Operators in South America were in second place with 22% (5 cases) of the accidents. Operators from the Far East were also mentioned; they were involved in 17% (4 cases) of the occurrences that highlighted inadequate regulatory oversight. The priority of action must be applied to African regulatory oversight and the regional activities in South America must be maintained.

The third most predominant contributing environmental factor was airport facilities. This category includes: inadequate aerodrome support, failure to eliminate runway hazard, improper or misleading airport makings or information. This factor featured equally in both Jet and Turboprop accidents. Inadequacies in airport facilities were noted in 12 accidents; 42% (5 cases) of these events took place in Africa. This further confirms the need for IATA to maintain its focus of infrastructure issues in Africa.

Overall, 6 accidents featured both inadequate airport facilities and poor regulatory oversight. Four of these accidents involved Western-built Jets. Inadequate airport facilities and poor weather were combined in almost a third (7 cases) of the accidents involving environmental factors.

4.2.6 Technical Factors

These factors refer to aircraft systems and/or components and their airworthiness and/or serviceability. When analysing contributing technical factors for Western-built Turboprop and Jet aircraft, there is a noticeable difference between both types of operations. Turboprop accidents featured a more elevated number of contributing technical factors, in contrast with Jets. Technical factors were cited in 17% of all contributing factors involving Turboprop aircraft. However, they were only associated in 4% of all contributing factors in Jet aircraft accidents.

Company maintenance and servicing was noted as the main technical factor in Turboprop accidents. **Four out of the 5 events that cited maintenance as a contributing factor in Turboprop accidents occurred in North America.** Flight Control failure that affects the controllability of the aircraft, was the second technical aspect attributed to Western-built Turboprop occurrences, as well as contained engine failure or malfunction. **Airworthiness is clearly a major issue highlighted in the 2003 classifications for Turboprop aircraft.**

Design/manufacturing issues, extensive engine failure/uncontained engine fire and landing gear malfunction were equally identified as the most common types of contributing technical factors in Western-built Jet accidents during 2003.

The average age of Western-built Turboprop aircraft involved in accidents that had a technical aspect was 22.7 years old. The average age for Western-built Jet aircraft cited, as having contributing technical factors, was 16.3 years old. Ageing aircraft do not necessarily translate into reduced safety. This simply demonstrates the need for adequate maintenance and ageing aircraft programmes.

4.2.7 Accidents by Phase of Flight

Figure 4.2.D presents both Western-built Jet and Turboprop accidents by phase of flight. During 2003, the majority of accidents occurred during approach and landing. **In total, 57% of accidents (42 cases) involving Western-built aircraft occurred during these two phases of flight. Almost half (48%) of these occurrences resulted in a Hull Loss.**

Figure 4.2.D
Operational Accidents by Flight Phase

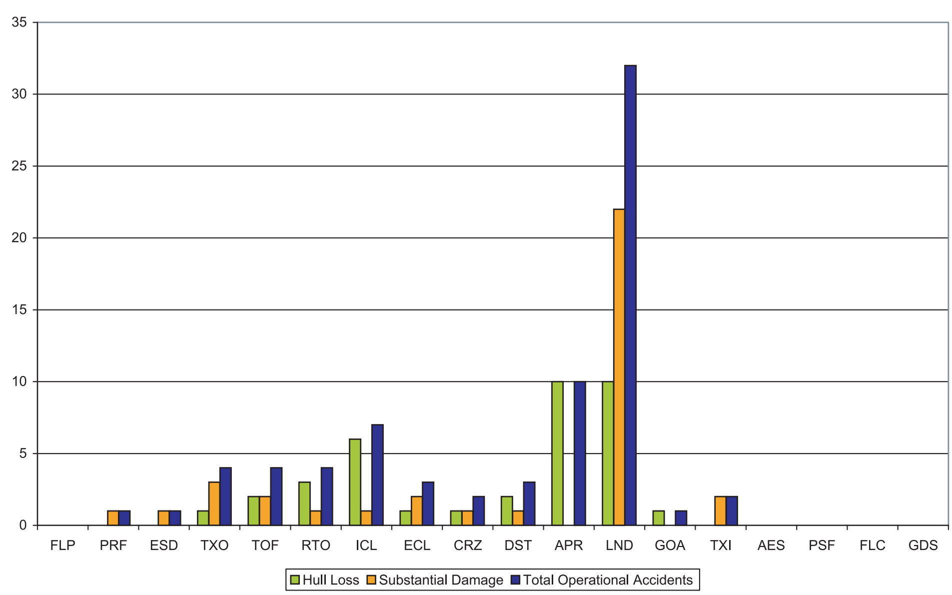
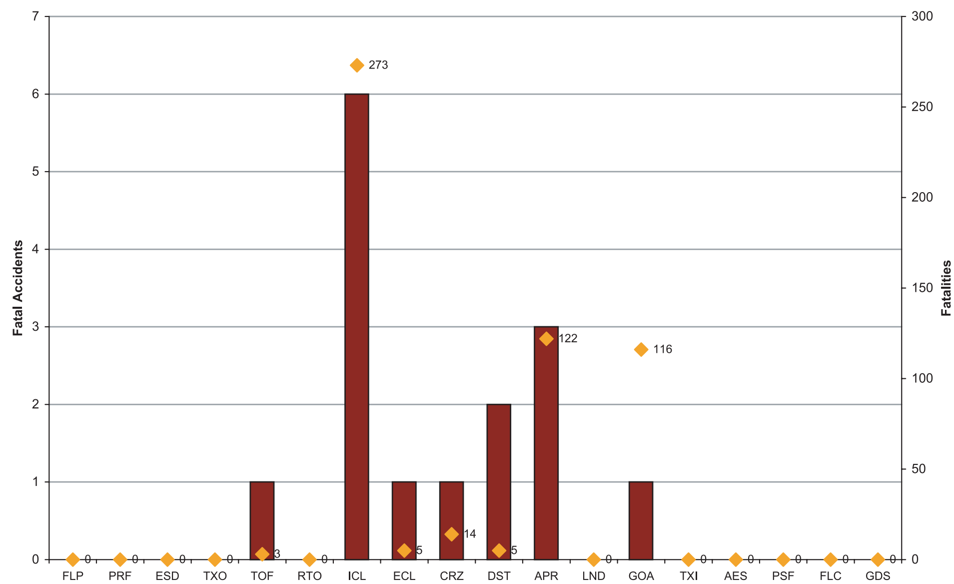


Figure 4.2.E illustrates Fatal accidents by phase of flight. **Most fatal accidents (40%) occurred during initial climb. Out of the 15 fatal accidents, which took place in 2003, only 3 were produced during the approach phase of flight and none were recorded during landing.** There were 538 fatalities on board Western-built aircraft in 2003; 51% (273) of these occurred during initial climb. Fatalities that were produced during approach accounted for 23% (122 fatalities) of all deaths on Western-built aircraft for the year.

Figure 4.2.E

Fatal Accidents and Fatalities by Phase of Flight

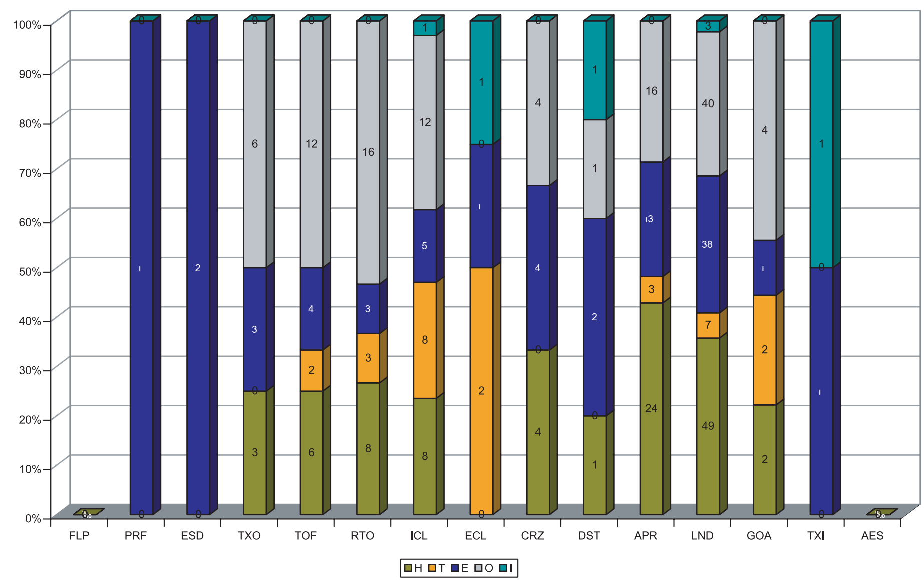


4.2.8 Contributory Factors by Phase of Flight

Contributing factors by phase of flight are presented in Figure 4.2.F for both approach and landing accidents, organisational factors were identified as the main contributor, cited in 35% of occurrences produced during these two phases of flight combined. Human factors were cited in 30% of events (9 cases) that took place on approach, in comparison to 18% for accidents produced during landing. On landing accidents, environmental factors were attributed to 24% of events (8 cases), versus 20% for occurrences on approach. There were twice as many contributing technical factors identified in accidents that occurred during landing than on approach.

- Most contributing technical factors were associated with accidents produced in initial climb. Engine failure/malfunction (contained), flight controls and company maintenance were all equally cited for this phase of flight. Therefore, airworthiness, or the lack thereof, precipitated these fatal accidents.
- Most human factors were cited during approach. Proficiency was the main human aspect identified in this category, followed by operational decisions.
- Most environmental factors were attributed to the landing phase. Weather was the predominant factor.
- Most organisational factors contributed during Rejected Take-off. Training issues, SOPs, checking and auditing and Safety Management Systems were all equally cited in this category.

Figure 4.2.F
IATA Contributory Factors by Phase of Flight



Prevention Strategies:

3. *IATA will continue to campaign for the implementation of SMSS and also supports SMS throughout the aviation community.*
4. *HFWG will continue its work on human factors to understand better their participation in incidents and accidents and to develop tools and prevention strategies to manage human error. This is highlighted by findings that link human factors to a large number of accidents produced in 2003.*
5. *IATA will maintain focus on regional initiatives in Africa and South America, with a particular focus on infrastructure and regulatory oversight.*
6. *Air carriers and regulators in North America should address airworthiness and maintenance issues among Western-built Turboprop fleets.*
7. *IATA will monitor incidents and accidents that occur in initial climb, with a particular focus on the technical issues that precipitate them and the handling of these events by flight crews. This recommendation is made in light of the fact that most fatal accidents in 2003 occurred during initial climb.*

4.3 CLASSIFICATIONS FOR EASTERN-BUILT AIRCRAFT

4.3.1 2003 Events

In 2003, 17 events were identified involving Eastern-built Jet or Turboprop aircraft, which resulted in a Hull Loss or a Substantial Damage accident.

- Eleven events resulted in Hull Losses.
- Eastern-built Jet aircraft were involved in 6 accidents.
- Eight accidents implicated cargo flights; 7 of these resulted in Hull Losses. Only 2 of these accidents took place at night.
- Ten accidents were passenger flights; 4 of them resulted in Hull Losses. Only 1 passenger flight accident occurred at night.
- Six events involved runway excursions.
- Two accidents resulted in CFITs; both cases were to Jet aircraft.
- Two events involved a loss of control in-flight.
- One additional Eastern-built aircraft accident resulted in passenger fatalities without damage to the aircraft.

4.3.2 Contributing Factors

The results of the classifications for the Eastern-built Jet and Turboprop accidents that occurred in 2003 are presented in Figure 4.3.A.

Figure 4.3.A
Contributory Factors for Eastern-built Jet and Turboprop Aircraft

Contributory Factors			HUM		TEC		ENV		ORG		I
Human Factors	**HUM**	**21**	H1 — Active Failure	4	T1	2	E1	5	O1	9	
Technical	**TEC**	**9**	H2 — Passive Failure	8	T2	2	E2	0	O2	8	
Environmental	**ENV**	**25**	H3 — Proficiency/Skill Failure	6	T3	1	E3	1	O3	8	
Organisational	**ORG**	**30**	H4 — Incapacitation	1	T4	0	E4	2	O4	0	
Insufficient Data	**I**	**2**	H5	2	T5	0	E5	5	O5	0	
			H6	0	T6	0	E6	1	O6	0	
					T7	2	E7	1	O7	0	
					T8	0	E8	0	O8	0	
					T9	0	E9	0	O9	0	
					T10	0	E10	0	O10	0	
					T11	2	E11	10			
					T12	0					
	Total	**87**		**21**		**9**		**25**		**30**	**2**

The relationship between contributing factors attributed to the events involving Eastern-built aircraft are presented in Figures 4.3.B and 4.3.C. Contributing factors attributed to Eastern-built Turboprop accidents differed from those cited in Jet accidents. Human factors were predominant in Eastern-built Jet accidents. Organisational factors were most frequently identified in Eastern-built Turboprop accidents and ranked second in Jet accidents. Turboprop operations had a relatively higher number of environmental contributors, in relation to human factors. When examining the overall relation of contributing factors, technical factors were also more predominant in Turboprop accidents versus Jets, which is similar to findings for Western-built fleets. Only two Eastern-built aircraft accidents had insufficient information, rendering their classification impossible. Both of these involved Turboprop aircraft.

Figure 4.3.B
Contributory Factors for Eastern-built Jet

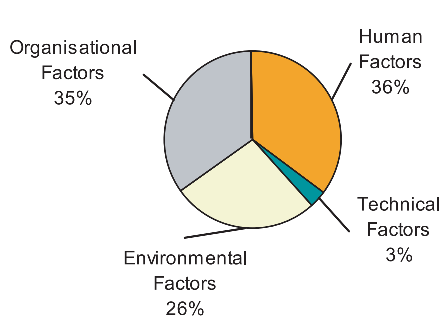
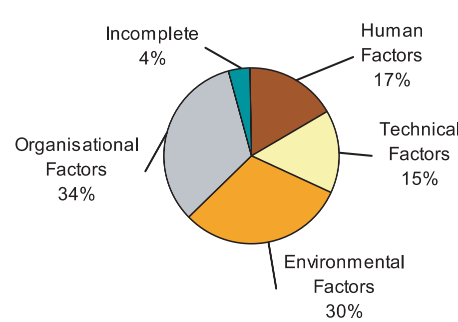
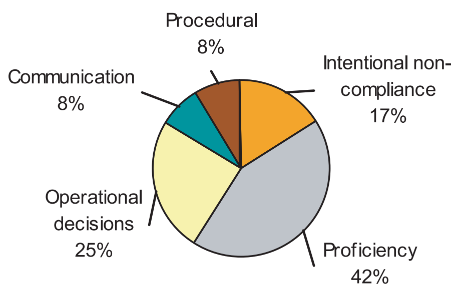


Figure 4.3.C
Contributory Factors for Eastern-built Turboprop



4.3.3 Human Factors

Figure 4.3.D
Contributory Human Factors for Eastern-built Jet



In 5 out of the 6 Eastern-built Jet accidents, human factors were presented as contributors. Figure 4.3.D illustrates a breakdown of the contributing human factors associated with Eastern-built Jet accidents. **Proficiency issues accounted for 42% of all the human factors components identified in these events. Performance failures due to skill or knowledge deficiencies were cited in this category. Operational decisions were noted in second place, accounting for a quarter of human factors linked with the occurrences. Intentional non-compliance was noted in third place.** Deliberate deviations from regulations or operational procedures were cited in these events. The same three subcategories of human factors were identified in Eastern-built Turboprop accidents. However, human factors ranked third among all the contributing factors in Eastern-built Turboprop events. Overall, 36% of all the Eastern-built Turboprop accidents had a human factors component. Over twice as many human factors components were attributed to Eastern-built Jet accidents.

4.3.4 Organisational Factors

Second only to human factors, organisational factors were often cited as contributing elements in Eastern-built Jet accidents. A breakdown of these factors demonstrates that inadequate training was the most frequently identified organisational element. Deficient or absent Safety Management Systems, inappropriate SOPs, checks and audits were also noted. **Organisational factors ranked in first place among the types of contributing factors attributed to Turboprop accidents, confirming the findings among the Western-built Turboprop fleets.** The same factors mentioned in Jet accidents were cited but the managerial environment (maintenance, cabin safety, dispatch, etc.) was also thought to have been inadequate in these cases.

4.3.5 Environmental Factors

Environmental factors ranked third among the types of contributing factors for both Turboprop and Jet accidents. **Regulatory oversight was the main type of environmental aspect attributed to both Eastern-built Jet and Turboprop accidents. Regulatory oversight was noted in 10 accidents.** Half of these accidents occurred in the African region. Four out of the 10 operators involved were African and 4 were European. Flight crew proficiency issues were noted in 6 out of the 10 accidents implicating poor regulatory oversight. All this again mirrors the findings amongst the Western-built fleets.

For Eastern-built Jets, weather was in second place among the environmental contributors. Poor weather played a part in three Jet accidents, versus two accidents involving Turboprops. Four out of the 5 accidents involving weather resulted in a Hull Loss.

For Turboprop operations, airport facilities were quoted in second place, highlighted in 4 accidents. In all these cases, poor regulatory oversight was also noted. None of the turboprop accidents involving airport facilities happened in poor weather. Only one of these Turboprop accidents is known to have happened at night. Overall, 5 accidents involving Eastern-built aircraft and inadequate airport facilities were recorded for 2003. Four out of the 5 accidents took place in Africa, the other in the Far East. Airport facilities were only cited as a contributing factor in 1 Eastern-built Jet accident; this was combined with poor weather at the time of the event.

4.3.6 Technical Factors

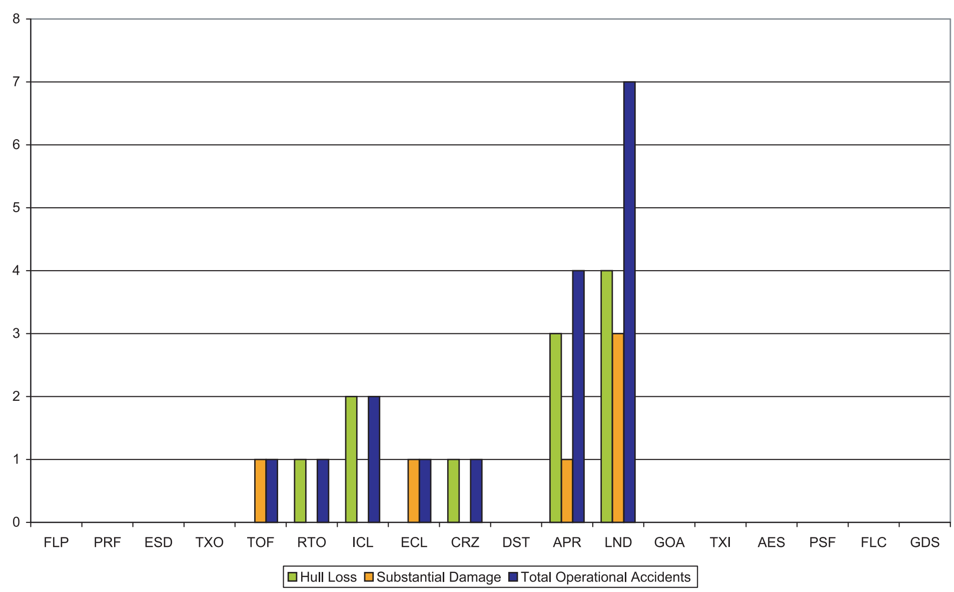
Technical factors contributed to 12 Eastern-built aircraft accidents in 2003. Technical factors were cited five times more often in the overall contributing factors for Turboprop occurrences than those involving Jets. In total, 15% of all contributing factors in Turboprop accidents involved technical aspects, versus only 3% in Jets. Only 1 out of the 6 Eastern-built Jet accidents had a technical malfunction. **In contrast, 5 out of the 11 accidents involving Eastern-built Turboprop**

aircraft suffered technical problems. Uncontained engine failure, systems failure and inadequate company maintenance were equally cited as the top three technical contributing factors for Jet and Turboprop accidents. The average age for Eastern-built Turboprops involved in accidents with technical issues was 26.2 years old, on average some 3.5 years older than the Western-built Turboprop fleets. Eastern-built Turboprop airworthiness is a primary concern.

4.3.7 Phase of Flight

Figure 4.3.E illustrates Hull Losses and Substantial Damaged events by phase of flight for Eastern-built Turboprop and Jet aircraft combined. **The majority (64%) of Hull Losses took place during approach and landing. This mirrors the findings in Western-built aircraft. Half of the accidents resulting in substantial damage to aircraft also took place during these two phases of flight.** Organisational and environmental factors were cited as the main two contributing factors in accidents that occurred during approach and landing.

Figure 4.3.E
Operational Accidents by Flight Phase

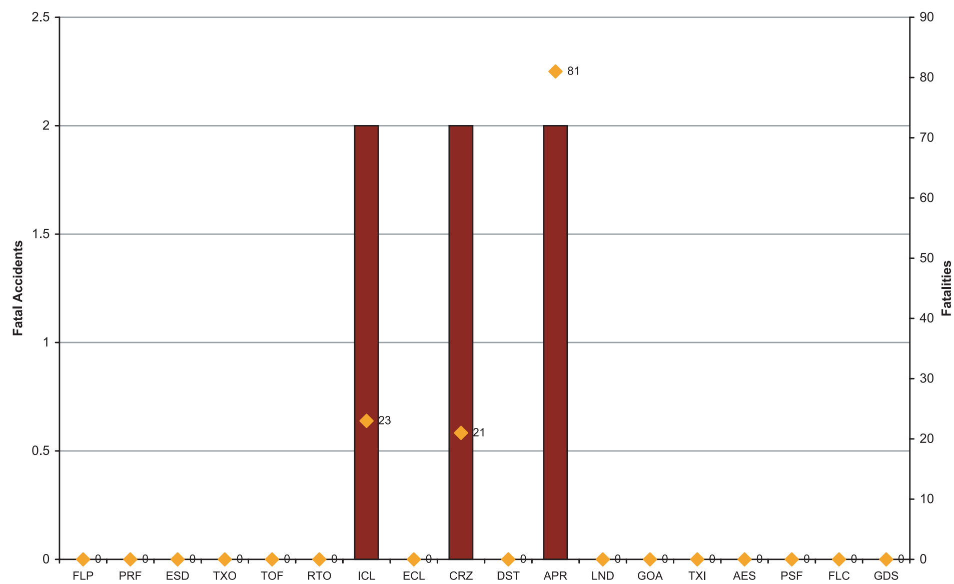


Fatal accidents by phase of flight are presented in Figure 4.3.F. Out of the 6 fatal accidents involving Eastern built aircraft, 3 occurred on Jets and 3 on Turboprops. **Two thirds of the fatal Turboprop accidents were produced during initial climb. This phase of flight was also predominant in the fatal accidents involving Western-built aircraft.** Two thirds of the fatal Jet accidents occurred during approach.

Eastern-built Turboprop and Jet accidents combined resulted in 125 fatalities in 2003. In total, 76% of cases (95 fatalities) occurred on board Jet aircraft. The majority of fatalities occurred during approach. This phase accounted for 65% of the total number of known fatalities. Onboard Eastern-built Jets, most fatalities (85%) occurred during approach. The majority of fatalities (77%) in Eastern-built Turboprop aircraft occurred during initial climb. No fatalities were recorded onboard Eastern-built aircraft during the landing phase.

One accident was recorded but was neither classified as a Hull loss nor as Substantial Damage. It is considered the 18th accident involving an Eastern-built aircraft. During cruise, 14 passengers were killed after being expelled from an Eastern-built Jet. They are counted among the fatalities cited above.

Figure 4.3.F
Fatal Accidents and Fatalities by Phase of Flight



Prevention Strategies:

8. *IATA will coordinate efforts with Eastern-built aircraft operators to understand better the operational environment these aircraft operate in and the threats that are associated with it.*
9. *HFWG will pursue research into human factors in Eastern-built aircraft, as they are significant contributors in accidents involving these aircraft, particularly Jets.*
10. *IATA will campaign for regional initiatives into airworthiness and maintenance issues with a particular focus on Eastern-built Turboprop operations.*

4.4 AIR CARGO OPERATIONS 2003 (DEDICATED FREIGHTER AIRCRAFT)

4.4.1 2003 Air Cargo Operations Events

In 2003, there were 26 accidents involving cargo aircraft. An overall review of the year's air cargo operations accidents is presented in chapter 3. **Overall, 28% of all the year's accidents involved cargo aircraft.** Half of the accidents occurred in daylight. Ten accidents were produced at night and darkness was cited as a contributing factor in 5 of these accidents. The time of occurrence remains unknown for three cases.

4.4.2 Western-built Cargo Aircraft Accidents

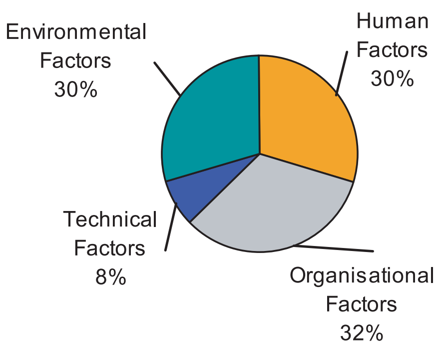
Western-built aircraft were implicated in 18 accidents. Ten of these events resulted in Hull-Losses.

Half of the accidents involved Western-built Jets. Figure 4.4.A illustrates the relationship between contributing factors for Western-built cargo aircraft accidents.

Organisational factors were the most frequently cited contributors to cargo aircraft accidents. Deficiencies in standards, checks and audits were predominant in this category. They were attributed to 7 cases. Training issues were also highlighted in this category. These findings highlight the need for IATA to continue the development of its IOSA programme to audit cargo operations.

Figure 4.4.A

Contributory Factors for Western-built Cargo Aircraft



Human and environmental factors were also prevalent. Poor weather was associated with 7 out of the 18 accidents. Only 1 of these events occurred in an airport whose facilities were believed to be inadequate. Poor regulatory oversight was noted in 5 cases. **Operators in Africa were involved in 44% (eight cases) of Western-built cargo aircraft accidents. Overall, 39% of accidents involving cargo aircraft occurred in the African region and 22% in Europe.** This data raises serious concerns about cargo operations in Africa.

Proficiency issues and operational decisions were the main two main types of human errors believed to have contributed to the Western-built cargo aircraft accidents during 2003. Eight events cited proficiency issues. Six of these cases also identified Standards, checking and auditing issues relating to the organisation and 5 cases noted a combination of both proficiency issues and inadequate training.

Technical Factors were attributed to only 4 out of the 18 accidents but all the accidents involved Turboprop aircraft. Western-built cargo Turboprop airworthiness is a concern. Problems relating to landing gear and/or tyres accounted for 3 out these 4 accidents. In 2 out of the 4 accidents, human factors were believed to have played a contributory role. **The average age of Western-built aircraft involved in the cargo accidents for 2003 was 27.8 years old.**

One accident involving a Western-built cargo aircraft had insufficient information and could not be classified according to the categories mentioned above.

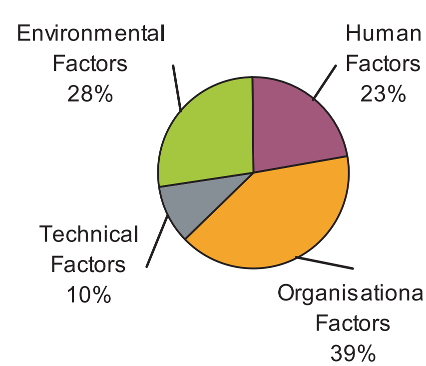
4.4.3 Eastern-built Cargo Aircraft Accidents

There were 8 cargo accidents involving Eastern-built aircraft in 2003. Seven of them implicated Turboprop aircraft. Overall, 7 accidents resulted in a Hull Loss; 6 of them implicated Turboprop aircraft. Eastern-built cargo aircraft operations are an area of concern.

Figure 4.4.B illustrates the relationship between contributing factors that are believed to have played a role in Eastern-built cargo aircraft accidents. There were very few differences in contributing factors between Eastern-built Jet and Turboprop accidents. Therefore, these events are presented together.

Figure 4.4.B

Contributory Factors for Eastern-built Cargo Aircraft



Organisational factors were the predominant contributors to accidents involving Eastern-built cargo aircraft. Deficiencies in Safety Management Systems were the most frequently identified organisational contributor, believed to have played a role in 5 out the 8 accidents. Managerial environment inadequacies were also highlighted, as well as deficiencies in SOPs, auditing and checking. Therefore, there is a need to implement SMS in cargo operations involving Eastern-built aircraft.

Regulatory oversight was noted as a contributing environmental factor in half of all the accidents (4 cases). **In total, 63% (5 cases) of Eastern-built cargo aircraft accidents occurred the African region. Half the operators involved in the accidents were African.** There is a need to focus on Eastern-built cargo aircraft operations in Africa. Three out of the 8 accidents (38%) implicated operators in Europe. Poor weather was attributed to 3 accidents, thus playing a role in 38% of events. Inadequate airport facilities were also cited in 3 accidents. However, poor weather and inadequate airport facilities were only combined in 1 accident, that occurred in the Far East.

Human factors ranked third among the overall contributing factors. Human factors were believed to have played a role in half of the accidents involving Eastern-built cargo aircraft. Proficiency issues and operational decision errors on the flight crew's behalf were the two most frequently cited human components. Deficiencies at the organisational level were identified in all the accidents involving human factors. A poor safety management system within the organisation was associated to all the accidents that contained a human factors contribution.

Technical factors accounted for 10% of all the contributing factors linked with Eastern-built cargo aircraft accidents. All the cargo aircraft that suffered technical failures were Turboprops. The types of contributing factors varied from 1 accident to the other but only 1 accident combined both a human error and a technical aspect. Organisational factors, such as inadequate training or managerial environment played a contributing role in all three accidents that had technical failures. The average age for Eastern-built aircraft implicated in cargo accidents for the year 2003 was 30.7 years old. One aircraft's age was unknown thus could not be incorporated into the average.

Two accidents involving Eastern-built cargo aircraft had insufficient information and therefore could not be classified under any category.

Prevention Strategies:

11. *IATA will continue to develop and promote its IOSA programme to assess cargo operations.*
12. *As part of the on-going effort to enhance Safety in Africa, IATA will give particular attention to cargo operations in this region.*
13. *IATA will monitor Western-built Turboprop cargo aircraft operations with a particular focus on airworthiness and maintenance issues.*
14. *IATA will campaign for the implementation of SMS to target specifically Eastern-built cargo aircraft operations, particularly in Africa.*

4.5 ANALYSIS OF FATAL ACCIDENTS

4.5.1 2003 Overview of 2003 Fatal Accidents

In 2003, there were 21 fatal accidents out of a total of 92 total accidents. One accident resulted in passenger fatalities in-flight with no damaged sustained by the aircraft. This accident is counted in the overall numbers but was not analysed in the cases presented below.

Technical factors are believed to have contributed to 45% (9 out of the 20) of the fatal accidents. Overall, 70% of the fatal accidents (14 cases) involved passenger flights. Less than a third of all the fatal accidents (6 cases) involved cargo flights.

Out of all the fatal accidents, 30% were CFITs (6 cases). Loss of control in-flight was identified as a contributing factor in 35% (7 cases) of all fatal events. Seven fatal accidents occurred at night. However, darkness was only believed to have contributed to three of these accidents. Meteorological conditions were identified in eight occurrences.

4.5.2 Fatal Western-built Jet Aircraft Accidents

During 2003, 7 fatal accidents implicated Western-built Jet aircraft. In total, 17% of all Western-built Jet accidents resulted in 1 or more fatalities to passengers or operating crew. CFITs accounted for three fatal accidents. In all these CFIT accidents, operational decisions were cited as contributing factors. A loss of control in-flight was identified as a contributing factor in 2 of the fatal accidents. Three accidents occurred at night, although darkness is believed to have played a role in only 1 case. Meteorological conditions were mentioned in three accidents.

Human factors were the predominant contributors. In 4 out of the 7 accidents, operational decisions on behalf of the flight crew were believed to have played a role in the event. None of the events associated with human error implicated a technical failure. In total, 2 accidents had technical components but human factors were also mentioned as contributing factors. One accident had insufficient information to allow an adequate classification.

4.5.3 Fatal Western-built Turboprop Aircraft Accidents

During 2003, there were 8 fatal accidents involving Western-built Turboprop aircraft. A quarter of all the Western-built Turboprop accidents resulted in at least 1 fatality to passengers or operating crew. One CFIT accident was identified; an operational decision error was linked to this event. **Loss of control in-flight was attributed to half (4 cases) of all the fatal Western-built Turboprop occurrences.** Two fatal accidents took place at night. Darkness is believed to have played a role in both these events. Meteorological conditions were associated with 2 fatal accidents.

Organisational factors were the predominant contributors. Human factors accounted for 21% of all the contributing factors identified in the fatal Western-built Turboprop accidents. **Human factors were cited almost twice as often among the contributing factors associated with fatal Western-built Jet accidents than those linked to Turboprop events. In fatal Western-built Turboprop accidents, technical factors were cited in twice as many events in comparison with Western-built Jet occurrences. Technical factors were linked to half (four cases) of all the fatal Western-built Turboprop accidents.** In 2 of the previous accidents, human factors were also believed to have played a contributory role.

Organisational and environmental factors were also mentioned among the 4 accidents with technical aspects. None of the accidents are believed to have resulted from purely technical factors. This is discussed in more detail in section 4.6.4. One accident had insufficient information and could therefore not be classified.

4.5.4 Fatal Eastern-built Jet Aircraft Accidents

In 2003, 3 fatal accidents involved Eastern-built Jet aircraft. **Overall, 43% of all Eastern-built Jet accidents resulted in at least 1 fatality.** In 1 event, the aircraft sustained no damage but the accident resulted in the death of some of the passengers onboard. Thus, only 2 accidents actually resulted in aircraft damage. Both of these events were CFITs. One accident occurred at night, although this was not cited as a contributing factor. Meteorological conditions were cited in both events. Operational decision errors were also mentioned in both occurrences. **No technical problems were cited in either of the accidents**.

4.5.5 Fatal Eastern-built Turboprop Aircraft Accidents

There were 3 fatal Eastern-built Turboprop accidents in 2003. These accounted for 27% of all Eastern-built Turboprop accidents in the year. One accident involved a loss of control in-flight. Only 1 accident occurred at night, but this was not considered a contributing factor. Meteorological conditions were believed to have played a role in 1 fatal accident.

Environmental and organisational factors were the most widely identified contributing factors in fatal Eastern-built Turboprop accidents; they were identified in all the events. Human factors represented 6 % out of all the contributing aspects, which played a role in the fatal Eastern-built Turboprop accidents. **This differs significantly from the fatal Eastern-built Jet accidents, in which human factors accounted for 34% of all contributing factors.** In contrast, technical factors were cited in all 3 fatal Eastern-built Turboprop accidents. No technical factors were cited in fatal Eastern-built Jet accidents. It is believed that 1 Eastern-built Turboprop accident involved both technical and human factors.

4.5.6 Fatal Accidents on Western-built Aircraft versus Eastern-built Aircraft

Overall, 20% of all accidents involving Western-built aircraft were fatal. On the other hand, a third (33.3%) of accidents involving Eastern-built aircraft resulted in fatalities to passengers or operating crew. **For Western-built aircraft, 80% of the fatal accidents involved passenger operations. For Eastern-built aircraft, half of the accidents implicated passenger operations and the other half involved cargo operations.**

A breakdown by Jet and Turboprop aircraft illustrates a noticeable difference between the number of fatal accidents involving Eastern-built and Western-built Jets. **Overall, 17% (7 cases) of all the Western-built Jet accidents for the year 2003 resulted in fatalities. On the other hand, 43% of all the occurrences implicating Eastern-built Jet aircraft resulted in fatalities.** This highlights the need to analyse and understand better the threats to Eastern-built Jet operations. For both

Eastern-built and Western-built Turboprop aircraft, fatal accidents represented approximately a quarter of all accidents in each of these categories.

<u>*Prevention Strategies:*</u>

15. IATA will pursue joint efforts with Eastern-built aircraft operators to understand better operational weakness that led to fatal accidents. A special focus should be placed on human factors and their contribution to these events.

16. Airlines and IATA will coordinate their efforts to promote Safety among Western-built Turboprop operators, with a particular focus on technical issues due to their noticeable presence in these events in comparison to Western-built Jet operations.

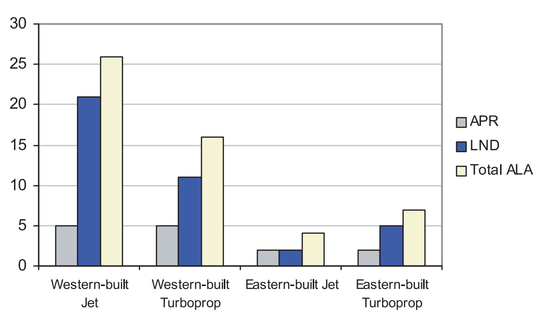
4.6 PRIMARY SAFETY ISSUES

4.6.1 Approach and Landing (ALA) Accident

During the year 2003, 53 accidents were produced during approach and landing. Overall, 58% of the year's accidents took place during these two phases of flight combined. Figure FF presents a breakdown of approach and landing accidents (ALA) by aircraft type and origin.

Figure 4.6.A

ALA Events for 2003



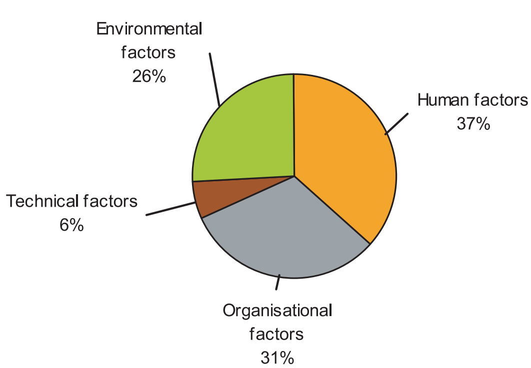
Almost half (49%) of the accidents that occurred on approach and landing during 2003 were produced on Western-built Jet aircraft. **Out of these 26 ALA events that involved Western-built Jet aircraft, 21 events were produced during landing, versus only 5 that occurred on approach. Accidents during the landing phase of flight were also predominant for Western-built and Eastern-built Turboprop aircraft.**

Out of the 42 accidents that implicated Western-built Jet aircraft during the past year, 62% were produced during approach and landing. In comparison, 64% of the 11 Eastern-built Turboprop accidents for 2003 took place during these phases of flight. Approach and landing accidents accounted for 57% of all the Eastern-built Jet occurrences for the year and for half of the Western-built Turboprop accidents.

Overall, 63% of the ALA events occurred during the day. In 28% of cases, the accident took place at night. In the remainder of the accidents, the time of occurrence remains unknown. The majority (70%) of events implicated passenger flights.

Figure 4.6.B

Contributory Factors in ALA Events



Over half the ALA events (51%) resulted in a Hull Loss. Out of these 27 Hull Losses, 13 were produced during approach and 14 during landing. The remainder of ALA events resulted in substantial damage to the aircraft. In 93% of these cases, substantial damage was incurred during the landing phase. Only 1 accident resulting in substantial damage happened on approach. Figure GG illustrates the relationship between the contributing factors associated with approach and landing accidents.

Human factors were the most frequently cited contributing elements attributed to ALA events. Proficiency issues were the main contributing human factor linked to approach and landing accidents. This type of human error was cited in 60% of the ALA events for 2003. **Operational decision errors were highlighted in 53% of the accidents. In these cases, the course of action taken by the flight crew is believed to have placed the aircraft and its occupants at unnecessary risk.**

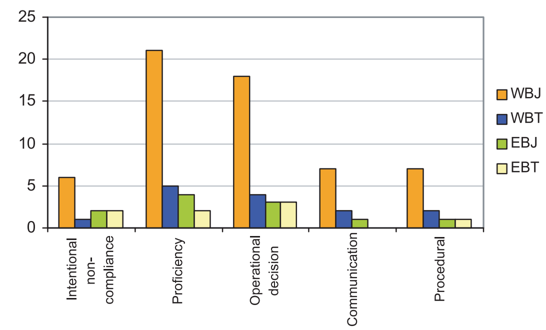
It is believed that 17 of the approach and landing accidents could have been avoided had a timely Go-around been initiated. It is therefore necessary to understand operational errors. The factors that motivate a flight crew to continue and attempt a landing when its success can no longer be assured need to be analysed in-depth. It is only upon the completion of such a refined assessment and the understanding of the results that it will become possible to develop appropriate prevention strategies at an industry level. To ensure its thoroughness, such a study can only be undertaken by qualified and recognised professionals in the field of human behaviour.

Figure HH presents a breakdown of the contributing human factors for approach and landing accidents by aircraft type and origin of manufacturer. An analysis of ALA events by aircraft type and origin of manufacturer demonstrates that the majority (66%) of proficiency errors were produced on Western-built Jet aircraft. Likewise, operational errors were also committed predominantly on Western-built Jets. For Western-built Jet aircraft, 76% of the proficiency errors were specific to the landing phase. Furthermore, 72% of the operational decision errors for this type of aircraft were also produced specifically during landing.

At the organisational level, inadequate or absent SOPs, company regulations and auditing processes were identified as the main contributing factor for this category, associated with 47% of the ALA events. Training issues were cited in 42% of the events. Thirteen out of the 22 accidents involving training deficiencies occurred on Western-built Jet aircraft.

Poor weather was the most frequently cited environmental factor in ALA events, predominantly during the landing phase. In 25 out of the 53 accidents, meteorology was mentioned as having played a role. Inadequate regulatory oversight was cited in over a third (36%) of the accidents.

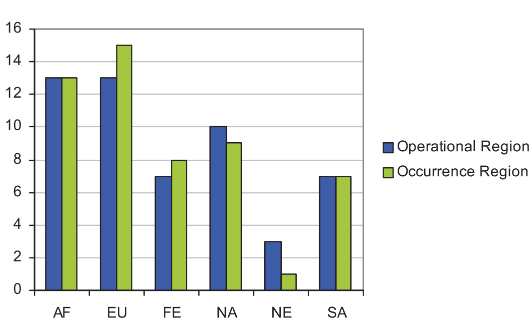
Figure 4.6.C
Contributory Human Factors ALA



Technical factors made up only a small part (6%) of the overall contributing factors attributed to ALA events. Landing gear and tyre malfunction and company maintenance were the two most frequently cited technical components.

A regional analysis of ALA events by region of occurrence and by region of the operator is illustrated in Figure 4.6.D. During 2003, 15 approach and landing accidents occurred in Europe and 13 ALA events were produced in the African region. North America ranked third followed by the Far East and South America.

Figure 4.6.D
ALA Events by IATA Region



Operators in Europe were involved in a quarter of the ALA events that took place in 2003. African carriers were implicated in almost a quarter (23%) of the accidents followed by operators in North America.

It was noted that in some cases, operational briefings were either not conducted or they were not comprehensive. Sound SOPs should include specific briefings for all approaches.

In the case of a precision approach such as an ILS during IMC conditions, it is recommended that SOPs are put in place, which explicitly explain the need for a coupled approach when the observed or forecast cloud base is within a prescribed height (eg: 500ft) of the minimum descent altitude. Such a requirement may contribute to a stable, more accurate and safer approach. Knowledge about the hazards involved in landing during heavy rain conditions should also be included in training programmes.

Prevention Strategies:

17. *IATA will continue to highlight the need to integrate a stable approach policy as a part of air carriers' SOPs.*
18. *The inherent dangers of non-precision approaches are often overlooked especially if the procedure involves a step down on final. The use of procedures to establish a Constant Descent Angle (CDA) Approach is recommended.*
19. *IATA will specify the need to have management responsibility and commitment for effective safety programmes including non-punitive Go-around policies.*
20. *SAC will convene a task force to analyse Go-around mindedness.*

4.6.2 Controlled Flight Into Terrain (CFIT)

In 2003, 8 accidents resulted from Controlled Flight into Terrain (CFIT). Figures 4.6.E and 4.6.F present CFIT accidents and fatalities for Western-built aircraft.

Figure 4.6.E

Western-built Jet CFIT Accidents and Fatalities

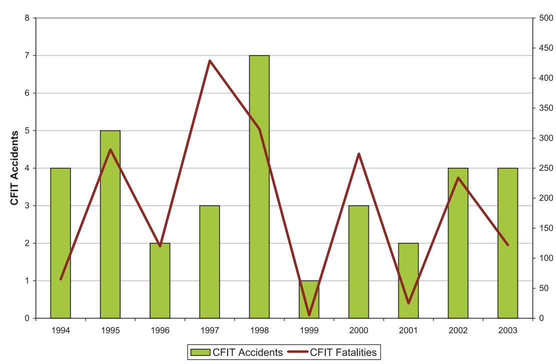


Figure 4.6.F

Western-built Turboprop CFIT Accident and Fatalities 1999-2003

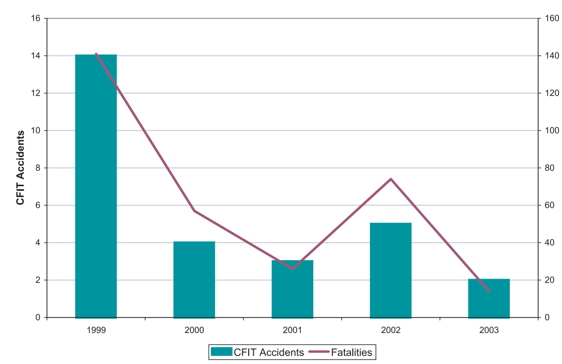


Figure 4.6.G

CFIT Accidents by Aircraft Type and Origin

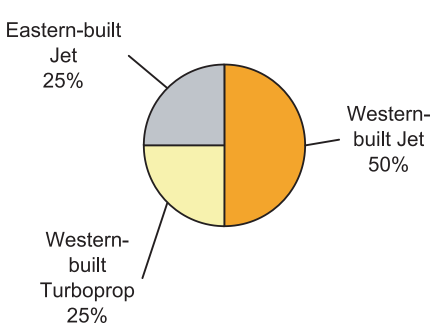
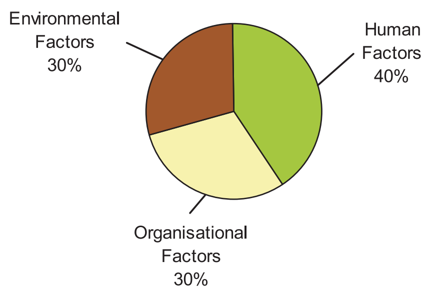


Figure 4.6.G illustrates the type of aircraft involved in these accidents and the origin of the manufacturer. Half of the CFIT accidents (4 cases) implicated Western-built Jet aircraft. A quarter of the events (2 cases) involved Western-built Turboprop aircraft and the remaining accidents occurred on Eastern-built Jets. No Eastern-built Turboprop aircraft are known to have been involved in CFIT accidents during 2003.

Figure 4.6.H

Contributory Factors in CFIT Accidents

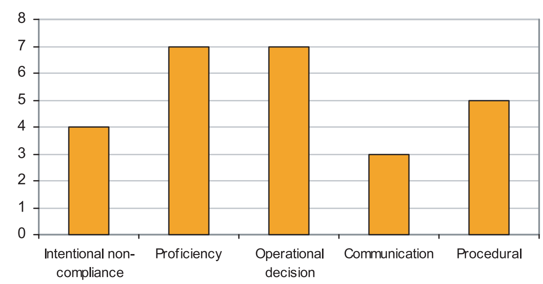


Six of the CFIT accidents were fatal. Therefore, in two cases, occupants survived. Half of these fatal accidents occurred on Western-built Jets. One fatal accident implicated a Western-built Turboprop. Both CFIT accidents produced on Eastern-built Jet also resulted in fatalities on board. Figure 4.6.H illustrates the relationship between the contributing factors associated with all the CFIT accidents for the year 2003. **Human Factors accounted for 40% of all the contributing factors believed to have played a role in CFIT accidents.** Human factors were predominant contributors in both CFIT and ALA accidents. This reflects the need for the HFWG to continue to focus on these types of occurrences.

Figure 4.6.I presents the different human factors classifications associated with CFIT accidents. **A breakdown of the contributing human factors demonstrates that operational decision-making and proficiency issues were equally cited. Combined, these two sub-categories accounted for over half (54%) of all contributing human factors associated with CFIT accidents.** Procedural issues were cited in five cases and intentional non-compliance is believed to have been a contributing factor in four events.

Figure 4.6.I

Contributory Human Factors in CFIT Accidents



Organisational factors made up almost a third (30%) of all the contributing factors associated with CFIT accidents in 2003. Inadequate or absent SOPs, checks and audits were noted in six out of the eight accidents. **Deficient or non-existent safety management systems (i.e. safety data collection and analysis systems or voluntary confidential reporting systems) were cited as contributing factors in half of the accidents.** Training issues were also noted in three cases. These occurrences demonstrate that the lack of SMS can play a contributing role in the CFIT and overall ALA events.

None of the aircraft involved in CFIT accidents were equipped with Enhanced-Ground Proximity Warning System (E-GPWS). Only four of the eight aircraft are known to have had Ground Proximity Warning System (GPWS) fitted onboard. One of the aircrafts' GPWS was disabled. A detailed look at EGPWS is presented in the following section.

Meteorological conditions were linked to all 8 accidents. **In 7 out the 8 accidents citing poor weather, proficiency issues were also mentioned. In five cases, poor or non-existent ground navigation aids were cited as contributing factors. In half of the CFIT accidents (4 cases), deficient or absent regulatory oversight was noted as having played a role in the accident.** Half of the CFIT accidents, produced in 2003, occurred at night. However, darkness was only cited as a contributing factor in 1 event.

Figure 4.6.J
CFIT Accidents 2003 by Region

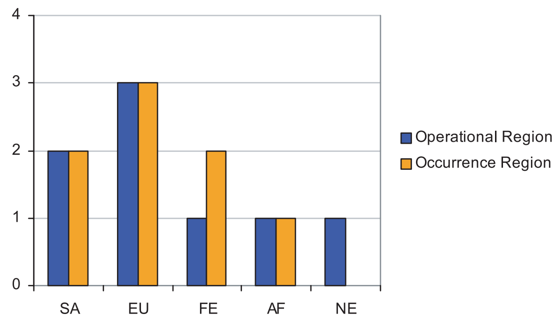


Figure 4.6.J illustrates CFIT accidents by IATA region. Three CFIT accidents occurred in Europe. A quarter of the accidents (2 cases) occurred in South America and another quarter were produced in the Far East. One CFIT accident was recorded in Africa.

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

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

E-GPWS has been designed to provide 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 and a Global Positioning System (GPS) input from the aircraft GPS or an internal GPS in the E-GPWS computer itself. A second 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 crews 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”.

To date, over 25 potential CFIT incidents have been documented over the past five years where E-GPWS has assisted in preventing accidents. E-GPWS is predicted to reduce the risk of CFIT accidents by a factor of 100 (1 CFIT accident per 250,000,000 departures). The system is also known in some areas as Terrain Awareness Warning System (TAWS).

Regulation

ICAO Annex 6 currently requires aircraft be fitted with a ground proximity warning system which has a forward looking terrain avoidance function (i.e. EGPWS) according to the following table:

Figure 4.6.K
ICAO Annex E-GPWS Requirements

Date	Max. Certificated Take-Off Mass	Authorised Passenger Load	Regulation
1 January 2003	15,000 kg	More than 30	All turbine-engined aircraft
1 January 2004	5,700 kg	More than 9	All new-build turbine-engined aircraft
1 January 2007	5,700 kg	More than 9	All turbine-engined and piston-engined aircraft
1 January 2007	5,700 kg	More than 5 and less than 9	All turbine-engined aircraft **(Further Recommendation)**

A recommendation in the 2002 Safety Report called for IATA to monitor industry compliance with E-GPWS installation and campaign for all IATA aircraft to be upgraded at the earliest opportunity.

The latest information regarding E-GPWS: (provided by Honeywell)

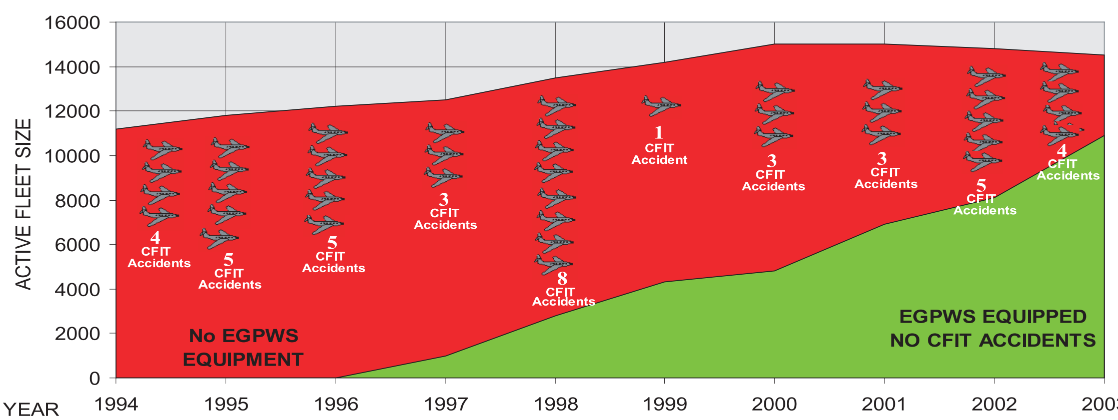
Figure 4.6.L
E-GPWS Information

Aircraft fitted and flying with E-GPWS	18,000+	
Worldwide Large Commercial Jets:	11,600+ of 14,500 aircraft	80%
Europe	2,822 of 3,400 aircraft	83%
USA:	5000+ of 5,800 aircraft**	86%
Regional USA:	*720 of 1,500*	*48%*
Air Taxi -Cargo Part 135	*120 of 1,500*	*8%*
Business/Corporate/other:	*5000 of 10,000**	*53%*
Delivered EGPWS Computers:	*25,000+*	
Flight sectors flown	*Exceeds 105,000,000*	
Audited flight sectors	*Exceeds 3,000,000*	

*** 1,260 with no GPS*

** includes approx. 550 TAWS provided by other manufacturers*

Figure 4.6.M
GPWS versus E-GPWS Active World's Large Commercial Jet Fleet



Provided by Honeywell

Figure 4.6.M 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 in addition to other defences it is equipped with E-GPWS, however an E-GPWS with outdated information provides a misleading sense of comfort. To get the most CFIT risk reduction from E-GPWS, the airline needs to provide GPS position to E-GPWS, use the latest software and use the latest database.

- **GPS:** There are approximately 2,000 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 are 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 the airline, 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 database current. It is provided free of charge from Honeywell 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 e-mail 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.

Prevention Strategies:

21. *Organisations should develop explicit SOPs, based on the CFIT/ALAR Toolkit to counter CFIT accidents, which are tailored to their operational environment and verify adherence to their procedures.*
22. *IATA will continue to promote fitting aircraft with E-GPWS and campaign for IATA member airlines to upgrade their systems as early as possible.*
23. *Airlines and regulators should work together towards eliminating step-down approaches.*

4.6.3 Operational Decisions

Operational decisions have been included under the new human factors classification system utilised by IATA to designate contributing factors in light of its annual accident review. In order to be classified as an operational decision error, the flight crew must adopt a course of action that unnecessarily compromises safety. This type of error generally meets one of the following criteria: the flight crew had other options within operational reason and decided not to take them; the flight crew had time but did not manage it effectively to reach or modify a decision. Examples of operational decision errors may include the decision to fly an approach through known wind shear instead of going around, or the decision to depart when the departure path may penetrate severe weather.

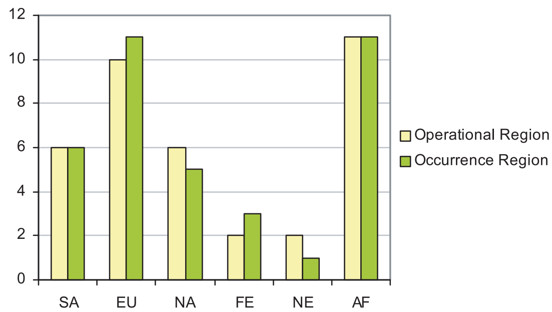
Operational decision errors were highlighted in 37 accidents produced during 2003. Overall, operational decision errors are believed to have played a part in 40% of all the year's accidents. A correlation with other contributing factors demonstrates a relationship between operational decision errors and proficiency issues. **In 81% of accidents (30 cases) involving operational decision errors, performance failure due to inadequate knowledge or skills was cited. This may result from a lack of experience, knowledge or training. In almost half (49%) of all the accidents associated with operational decision errors, failure by authority to exercise adequate regulatory oversight was also noted.**

Analysis of the contributing factors also determined a relationship between operational decision errors and organisational factors. Inadequate or non-existent SOPs, company regulations and auditing processes were quoted in 76% of accidents (28 cases) that included an operational decision component. Training issues were also noted in 62% of these accidents (23 cases). Omission or inadequacies in training, flight crew qualifications or operational needs leading to training reductions were among the deficiencies presented in this category. Inadequate or absent safety management systems were associated to almost half (18 events) of the accidents involving operational decision errors; poor weather was noted in 59% of the occurrences (22 cases).

Overall, 57% of the accidents citing an operational decision error (21 cases) resulted in a Hull Loss. Operational decision errors were cited as contributing factors in 8 CFIT accidents and 19 runway excursions.

A regional breakdown of the accidents involving operational decision errors is illustrated in Figure 4.6.N. Overall, 30% of these events (11cases) involved operators in Africa, followed by 27% of the occurrences (10 cases), which implicated operators in Europe. South American and North American carriers were each involved in 6 accidents. Inadequate regulatory oversight was noted in eight out of the 30% of the accidents that occurred in Africa and that cited operational decision errors. Deficient regulatory oversight was also cited in over a third of the events (36%) that occurred in the European region, and implicated operational decision errors.

Figure 4.6.N
Operational Decision Errors



The relationship between operational decision errors and inadequate SOPs, checking and auditing systems was highlighted among African operators. Poor SOPs, checking and auditing were noticed in 82% of the accidents involving operational decision errors and operators in Africa. A correlation between training deficiencies and operational decision errors was present in 6 events implicating African registered aircraft. Over half (55%) of the African operated aircraft involved in accidents combined operational decision errors and training issues. However, this relationship was more pronounced among operators in Europe. Eight events involving the preceding presented operational decision errors and training issues as contributing factors. The relationship between inadequate or non-existent safety management systems and operational decision errors stood out among operators in Africa. **Within that region, 73% of accidents (eight cases) that possessed an operational decision error component also featured a deficiency in safety management systems.** These findings reinforce the need for the propagation of SMS programmes in Africa.

When addressing operational decision errors, particularly by region, it is important to focus on the factors that induce operational errors rather than on the individuals who committed them. Individuals who produce operational decision errors do not possess the elements required to avoid them or are not in a position to use them. The oversight context, the organisational culture, or the training, auditing or managerial systems, among others, do not support conservative operational decisions. They may induce risk-taking decisions, which result in compromised safety. To dig further into the issue of operational decision errors, there is a need to get the whole picture and comprehend the pilot's perspective, in order to understand the factors that influenced the decision. One method to obtain this information is through analysis of air safety reports filed by pilots.

The adoption by flight crews of courses of action that unnecessarily increased operational risks was highlighted in many accidents during 2003. **The analysis of these occurrences suggests that, in most of them, a conservative course of action was available to flight crews. Nevertheless, flight crews did not recognise, or ignored, such course of action. This was frequently manifested by the continuation of unstable approaches that were outside parameters defined by SOPs, when the option of a Go-around, and the time to execute it, were available.**

Operational decision errors relating to failure to conduct a Go-around below MDA/DA, under time pressure at low height including flare, when visual references become progressively or suddenly insufficient for a controlled landing were highlighted during the classification process. One particular issue identified during this process was the unusual, unrecognised (and untrained) evolution of the visibility when flying into fog patches or heavy rain/snow showers: the closer flight crews get to the runway, the less they may see. This is the opposite of the "universal" evolution memorised by all pilots through thousand of landings: the closer they get to the runway, the more they see. This leads to a late recognition, if any, of the situation and an absence of a Go-around decision.

Prevention Strategies:

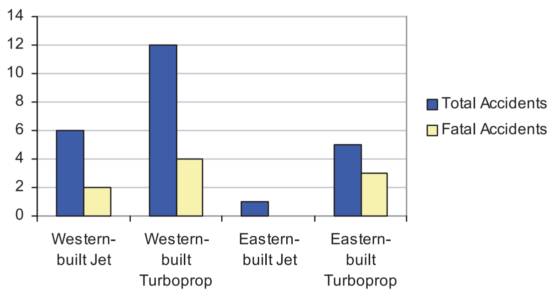
24. *STEADES will perform analysis of operational decision errors.*
25. *Firstly, corporate management should actively support and recognise conservative operational decisions by flight crews. This is particularly important for operational situations that are not explicitly addressed, or unforeseen, by SOPs. Also, low visibility simulations in flight simulators would be appropriate to promote adequate Go-around decisions.*
26. *SOPs should be reviewed by Flight Standards as necessary, to verify that they include explicit information as to elements of operational risk associated to specific phases of flight, as well as clear procedural guidelines for alternative courses of action.*
27. *Training and checking should emphasise and recognise flight crew adherence to conservative operational decisions. Training and checking programmes should be audited using IOSA and LOSA.*

4.6.4 Maintenance and Technical Failures

Technical factors relate to the review of airworthiness and the serviceability of an aircraft's systems (including errors by maintenance personnel) and components and their contribution following its implication in an accident. **Technical factors were cited in 26% (24 cases) of the accidents that occurred in 2003.** Figure 4.6.O illustrates the number of fatal accidents, which implicated technical factors in contrast with the total number of accidents where technical issues played a role.

Figure 4.6.O

Accidents Involving Technical Factors

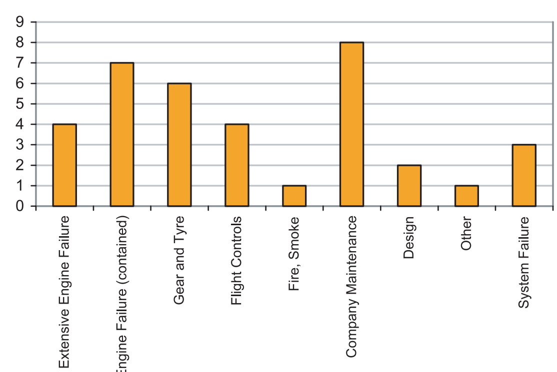


Western-built Turboprop aircraft were involved in half of the accidents containing a technical contributing factor. However, only a third of those accidents (4 cases) resulted in fatalities. A quarter of the accidents linked to technical issues occurred on Western-built Jet aircraft. A third of those accidents were fatal. Eastern-built Turboprop aircraft were involved in 21% of accidents comprising technical aspects. Three out of these 5 accidents resulted in fatalities to passengers or operating crew. Only 1 Eastern-built Jet accident possessed contributing technical factors; no fatalities were recorded for this event.

A breakdown of all the contributing technical factors is presented in Figure 4.6.P. **Deficient company maintenance was the most frequently cited technical factor believed to have played a role in 8 of the accidents.** Company maintenance issues include the use of false parts, unrecorded or improperly executed maintenance and lack of oversight. **This was linked to an organisational factor, poor managerial environment, which was mentioned in 5 accidents that involved inadequate company maintenance.** Inadequate or absent SOPs, operational policies, company regulations or auditing procedures were also cited in 5 cases entailing poor maintenance. In 3 events, company maintenance and poor regulatory oversight were noted as contributing factors in the accident chain.

Figure 4.6.P

Contributory Technical Factors



Engine failure was the second most frequently cited contributing technical factor. It accounted for 29% of all the contributing technical aspects associated with the year's accidents. In 4 out of the 7 cases involving engine failure, lack of proficiency on the part of the flight crew was believed to have played a role in the accident. At an organisational level, inadequate training was cited in 4 accidents implicating engine failure. **A correlation between deficient training, lack of proficiency and engine failure was noted in three out of the 7 accidents. Therefore, the issue in this case is a combination of the precipitant technical failure and the handling of the technical failure by the flight crew.** Managerial environmental was cited in 2 cases involving engine failure. This classification indicates that the management of certain activities, such as maintenance, may have been inadequate. Regulatory oversight was cited as a contributing factor in 6 accidents. In 4 of these cases, poor training was also cited.

Landing gear and tyre malfunctions, which may affect the aircraft's ability to take-off, land or manoeuvre on the ground, were also noted as contributing technical problems. Human factors were cited in 5 out of these 6 accidents. Operational decision errors and procedural errors and proficiency issues were the top contributing human factors. At the organisational level, inadequate training, deficient communication channels and poor managerial environment were mentioned as contributing factors.

Extensive engine failure was attributed to 4 accidents. Inadequate or absent safety management systems and omitted or improper SOP, checking and auditing were noted as contributing organisational factors in these accidents. In half of the cases, performance failures on the part of the operating flight crew were believed to have contributed to the accident, following non-contained engine damage.

Failure affecting aircraft controllability (flight controls) was associated with 4 accidents of a technical nature. This combined with meteorological conditions and contributed in 1 of these accidents. Poor managerial environment and inadequate SOPs, checks and audits were combined in half of the accidents involving flight control issues. No human error was attributed to any of these events.

Figure 4.6.Q

Technical Accidents by IATA Region of Operator

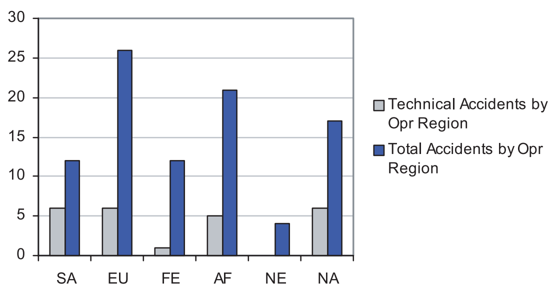


Figure 4.6.N presents the year's technical accidents by IATA operational region in contrast with the total number of accidents that occurred in that region during 2003. Technical issues were predominant in the South American region. Contributing technical factors were associated to half of the accidents implicating operators in South America. Over a third (35%) of the accidents that contained technical issues involved operators in North America. All of these North American events occurred on Western-built Turboprop aircraft. Technical factors were also cited in almost a quarter (24%) of the accidents that involved operators in Africa.

Prevention Strategies:

28. *IATA will promote regionally targeted, independent audits of company maintenance. This results from findings that cited poor maintenance in the majority of accidents featuring technical failures.*
29. *IATA and its HFWG will work towards applying the TEM model to maintenance to determine human factors and threats that contribute to maintenance issues.*
30. *STEADES should analyse incidents featuring technical failures to better comprehend how crews handle these failures.*

4.6.5 Loss of Control

A loss of control in-flight was cited in 9 accidents that occurred in 2003. Six cases involved Western-built Turboprop aircraft, 2 cases implicated Western-built Jet aircraft and 1 involved an Eastern-built Turboprop. Seven out of the 9 accidents were fatal. Most fatal accidents (5 cases) implicated Western-built and Eastern-built Turboprop aircraft.

Figure 4.6.R

Contributory Factors LOC

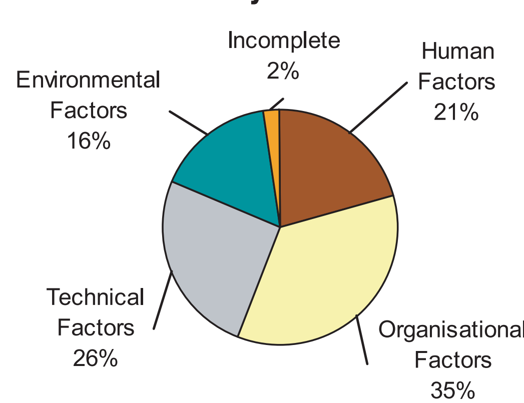


Figure 4.6.R illustrates the relationship between the contributing factors allocated to the 9 accidents involving a loss of control in-flight. Organisational factors were the most frequently cited contributing elements associated with the accidents. Deficiencies in standards, checking and auditing were highlighted in 6 out of the 9 accidents associated with a loss of control. Training issues were mentioned in almost half (4 cases) of the events. These issues can include deficiencies in flight crew qualifications or experience or insufficient assessment of training programmes. Inadequacies relating to the managerial environment and to safety management systems ranked third and fourth among the organisational factors believed to have played a part in the accidents.

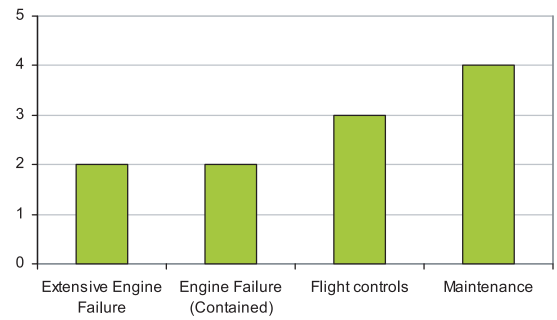
Technical factors made up over a quarter of all the contributing elements linked with loss of control events; they are presented in Figure 4.6.R. Maintenance was the main technical aspect highlighted in these accidents. Inadequate company maintenance was attributed to 4 out of the 9 accidents, 3 of which involved Western-built Turboprop aircraft. Maintenance issues and poor regulatory oversight were both noted in only 1 accident. This event took place in Africa. Failures affecting aircraft controllability were cited in 3 events; all of which involved Western-built Turboprop aircraft. Engine failures, both contained and uncontained, were implicated in four accidents. In 3 events, a failure or a malfunction of an aircraft system or component, related to the powerplant was noted as a contributing factor in the accident. In another 3 cases, a failure or a malfunction of an aircraft system or component other than the powerplant was established as a contributory element.

Performance failure due to inadequate proficiency was the main human factor believed to have contributed to 4 accidents entailing a loss of control. Communication issues were involved in 3 cases. At the environmental level, lack of regulatory oversight was highlighted in a third of the accidents. Poor weather was involved in 1 accident and darkness was believed to have played a role in 1 other event.

Almost half of the loss of control events (4 cases) occurred in North America. North American carriers operated all of the preceding cases. Two accidents involving a loss of control in-flight occurred in South America and 2 in Africa. One accident took place in the Far East.

Figure 4.6.S

Contributory Technical Factors LOC



Prevention Strategies:

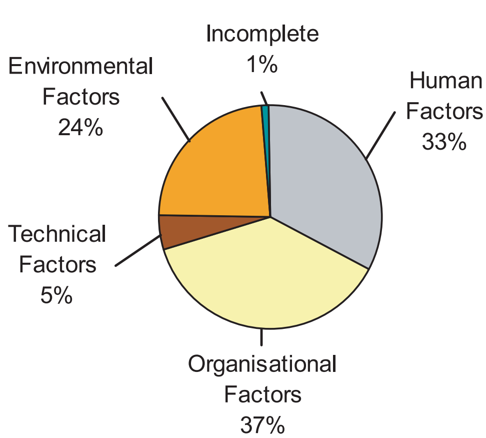
31. *IATA will focus on airworthiness and maintenance issues particularly with regards to Western-built Turboprop aircraft, in light of findings that linked these issues to loss of control events.*
32. *STEADES will conduct analysis on flight control incidents and determine contributing factors that can result in a loss of control in-flight.*

4.6.6 Runway Excursions

During the year 2003, there were 33 runway excursions. Western-built aircraft were implicated in 27 of the 33 excursions. Over half of the runway excursions (18 cases) involved Western-built Jet aircraft. Almost half (45%) of all the runway excursions resulted in a Hull Loss.

Figure 4.6.T

Contributory Factors in Runway Excursions

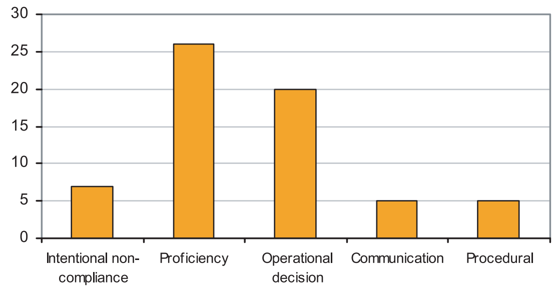


In the majority of the runway excursions (67%) occurred in daylight. In 21% of cases, the accidents took place at night. Darkness was cited as a contributing factor in 4 out of these 7 occurrences. Overall, 73% of all excursions (24 cases) were produced during landing. In 15% of accidents, runway excursions occurred following a rejected take-off. Twenty-seven runway excursions occurred during passenger flights. Only 6 out of the 33 cases implicated cargo flights.

Figure 4.6.T presents the relationship between the contributing factors associated with the year's accidents involving runway excursions. Organisational factors were the most frequently cited contributors to this type of accident. A breakdown of the participating organisational factors demonstrates that training and SOPs, check and auditing were the main aspects highlighted. These factors were predominantly mentioned in accidents involving Western-built Jet aircraft.

Figure 4.6.U

Contributory Human Factors in Runway Excursions



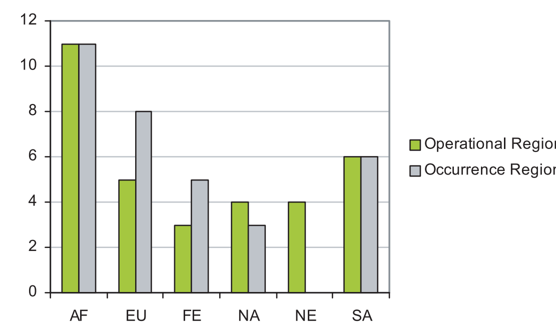
Human factors represented a third of all the contributing factors in runway excursions. Figure 4.6.U illustrates the human factors associated with the runway excursions. Proficiency issues were believed to have played a role in 26 out of the 33 runway excursions.

Poor regulatory oversight was associated with 18 excursions, making it the predominant contributing environmental factor. Meteorology was also believed to have played a role in 16 accidents. Inadequate airport facilities were cited in 9 excursions. Technical factors, mainly engine failure, were only cited in 3 runway excursions.

Runway excursions by operator and occurrence region are presented in Figure 4.6.V. A regional analysis of runway excursions demonstrates that most accidents occurred in the African region while being operated by African carriers. Overall, a third of the year's runway excursions occurred in Africa. Almost a quarter of the accidents (8 cases) took place in Europe, although operators in Europe were only implicated in 5 runway excursions. The South American region ranked third for overall runway excursion accidents. Six excursions were produced in that region, all of which implicated aircraft operated by South American carriers.

Figure 4.6.V

Runway Excursions by IATA Region



Prevention Strategies:

33. *IATA will focus on regional initiatives to aid in the reduction of runway excursions in Africa.*
34. *STEADES will conduct analysis on runway excursion incidents to determine contributing factors that were associated with these events.*
35. *According to the findings from the 2003 classifications, a particular focus should be placed on human factors in runway excursions. The HFWG should look into STEADES research findings and determine threats and errors that participated in these events in order to develop prevention strategies.*

4.6.7 Situational Awareness

Situational awareness (SA) is an outcome. Flight crews perform actions or processes (they execute SOPs, follow checklists, consult charts, receive ATC information, evaluate weather information, etc.), as a consequence of which they achieve, maintain or loose SA.

Processes implemented by operators also support flight crews in achieving, maintaining or loosing SA. The operator should question and refine its training, SOPs, checklists and briefings to ensure that they adequately respond to the operational environment's demands. Safety data analysis should help uncover operational weaknesses, which hold the potential to combine with specific operational circumstances to diminish a flight crew's SA. Safety information leading to the development of prevention strategies should therefore generate intelligence about a flight crew and/or an operator's actions or processes that promote, enhance or detract from SA, rather than simply stating a clear outcome.

IATA has chosen to remove the term loss of situational awareness from the Safety Report because this document aims at presenting operators with clear guidance that can be utilised to develop prevention strategies. The Safety Report aims at identifying specific safety concerns upon which concrete action can be taken. It seeks to identify the processes, both at the organisational level and the flight crew level, that lead to achieving or loosing SA. Operators can base proactive prevention strategies on these processes, in order to avoid an undesired outcome, such as a loss of situational awareness by flight crews.

4.6.8 Training and Proficiency

The analysis presented in chapter 4 highlighted deficiencies in both training and proficiency in many of the year's occurrences. **Training issues were identified as contributing factors in 39% of the total accidents. Proficiency issues were identified in half of the events.** Overall, 35% of the accidents reviewed showed a contribution of both training and proficiency factors combined.

Inadequate training was also associated with deficiencies in checking programmes in almost a quarter of the year's accidents. Training and checking programmes should be continually reviewed to ensure that they incorporate the industry's best practices. The use of IOSA is regarded as one such appropriate way to maintain high standards. The following training-related issues were also identified in the accidents that occurred in 2003:

- Training for engine failures is sometimes limited to about V1 on take-off. In at least 1 accident, it was determined that crew mishandling of the malfunction contributed to the accident that was produced following a failure that occurred well after V1.
- During the year, there were a small but significant number of accidents where aircraft encountered severe hail. These events raised questions regarding the need for operators to develop explicit procedures and training in the use of weather radar, as well as procedures for the recognition and avoidance of severe weather, including rain and hail. **These occurrences also raised a concern regarding the limitations of radar when dealing with specific situations such as hail.** Airborne weather radar gives the flight crew a tool for detecting bad weather during flight. The digital weather radar, with its multicolor navigation display. allows the crew to follow the best route to avoid weather problems. However, flight crews need to be aware of what weather radar will not detect. The radar is nothing more than a precipitation detector. How much weather it detects depends upon the raindrops, their size, composition and number. This means that it will not detect clouds, fog or wind (particularly small droplets or no precipitation at all), clear air turbulence (no precipitation), windshear (no precipitation except in microburst) or lightning. Furthermore, ice crystals, dry hail and dry snow may only give small reflections or none at all.
- Two accidents occurred while the crew attempted to conduct a three-engine ferry flight. The risks associated with this type of operation are high. These occurrences raised a concern regarding the knowledge crews possess about this specialised task. Operators should seek advice from the manufacturer before attempting such an operation.
- The IATA ACWG believes that the role of the First Officer, as either pilot flying or pilot not flying, plays a critical role in the operational decisions taken by the flight crew. Operational decision errors may have been produced because the course of action decided upon was not shared by all the crewmembers or perhaps the flight deck gradient (where there is a large gap between the experience of the crew) was too steep. In such circumstances, an experienced or dominant Captain could override, or discourage challenge, questions or comments from a First Officer, especially if he/she is a novice.

<u>Prevention Strategies</u>:

36. *IATA will campaign the use of IOSA to audits training programmes as necessary to ensure training, proficiency and checking standards are adequate.*
37. *Airlines should verify that procedures for dealing with engine failures in all phases of flight are included in their training programmes, and that they are not just limited to critical times such as V1.*
38. *Training programmes should provide crews with knowledge about the limitations of what weather radars cannot see. Procedures should deal with the recognition and the avoidance of severe weather including hail.*
39. *Airlines should ensure that explicit procedures are implemented for three-engine ferry operations, where company policy permits it. Flight crews should receive appropriate training for this type of operation.*
40. *Airlines should review their training programmes to ensure that First Officers are provided with adequate tools to enhance their assertiveness and promote their involvement in operational decisions.*
41. *Airlines should ensure that their SOPs mandate the use of headsets during critical phases of flight and verify that crews adhere to these policies during operations.*

4.7 OVERVIEW OF THE ANALYTICAL FINDINGS

Human factors were identified as the main contributing factor for Eastern-built Jet accidents and accounted for more than a third of all contributing factors in Western-built Jet accidents in 2003. The notable amount of contributing human factors in the year's accidents reflects the need for IATA to continue its HFWG activities.

Poor Safety Management Systems were particularly highlighted in Jet aircraft operations. This confirms the need for IATA to maintain its focus on implementing not only its own Safety Management Support System (SMSS) but also to support the propagation of SMS among the airline community.

Poor regulatory oversight was highlighted particularly among operators in Africa, followed by operators in South America. The priority of action must be applied to African regulatory oversight and the regional activities in South America must be maintained.

In 2003, the majority of accidents occurred during approach and landing. Most fatal accidents occurred during initial climb. Technical factors were involved in the majority of fatal Western-built aircraft accidents produced in initial climb. Therefore, airworthiness, or the lack thereof, precipitated these fatal events.

Human factors were the most frequently cited contributing elements attributed to ALA events. Training and SOPs, checking and auditing were the main aspects highlighted in runway excursions. A regional analysis of runway excursions demonstrates that most accidents occurred in the African region while being operated by African carriers.

Cargo aircraft were involved in over a quarter of all the year's accidents. Deficiencies in standards, checking and auditing and Safety Management Systems were the major factors associated with these events. These findings highlight the need for IATA to continue the promotion of its IOSA programme to audit cargo operations.

Operators in Africa were involved in the majority of both Eastern and Western-built cargo aircraft accidents. This data raises serious concerns about cargo operations in Africa.

In 2003, almost a quarter of the accidents were fatal. For Western-built aircraft, the majority of the fatal accidents involved passenger operations. For Eastern-built aircraft, half of the accidents involved cargo operations. Technical factors are believed to have contributed to almost half of the fatal accidents.

Human factors were predominant contributors in CFIT accidents. Deficient Safety Management Systems were cited as contributing factors in half of the accidents. In accidents that occurred in poor weather, proficiency issues were also mentioned. These occurrences demonstrate that the lack of SMS plays a contributing role in the CFIT events.

Overall, operational decision errors are believed to have played a part in 40% of all the year's accidents. Performance failure, due to inadequate knowledge or skills, was cited in the majority of these cases. In almost half of all the accidents associated with operational decision errors, failure by authority to exercise adequate regulatory oversight was also noted. Therefore, operational decision errors are not confined to the individual but can arise from other deficiencies in the organisation or the operational environment.

Technical factors were cited in over a quarter of the accidents that occurred in 2003. Technical failures were predominant among Western-built Turboprop aircraft. Deficient company maintenance was the most frequently cited technical factor. This was often linked to a poor managerial environment. Airworthiness is clearly a major issue highlighted in the 2003 classifications for Western-built Turboprop aircraft. A correlation between deficient training, lack of proficiency, and engine failure was noted. Therefore, a combination of both the precipitant technical failure and the handling of the technical failure by the flight crew participated in certain accidents. Technical factors made up over a quarter of all the contributing factors linked with loss of control events. Maintenance was the main technical aspect highlighted in loss of control accidents, 75% of which involved Western-built Turboprop aircraft.

Training issues were identified as contributing factors in 39% of the accidents that occurred in 2003. Proficiency issues were identified in half of the year's events. Inadequate training was also associated with deficiencies in checking programmes in almost a quarter of the year's accidents. This highlights the need to use IOSA to assess training programmes and crew proficiency.

CHAPTER 5 — INTEGRATED ACCIDENT PREVENTION PROGRAMME

The safety of the world's air transport system has always been IATA's highest priority. The task of achieving a safer air transport industry requires constant adaptation to new industry developments and practices. It also requires leadership, the direction of which often comes from the SAC and its Safety Report. The IATA Six-point Safety Programme reflects the new strategic direction of IATA and its member airlines. It will be apparent how relevant and aligned the programme is to the findings of the 2003 classifications and analysis of accidents. Established in close cooperation with SAC, OPC and the MSTF, the programme is focused on a system of areas that require integrated solutions in order to improve operational safety. The programme addresses areas of global concern, as well as unique regional challenges that are seen as the major impediments to improving safety in those areas. This chapter presents the current IATA programmes and initiatives for the year 2003 that help to ensure the constant enhancement of safety during the years to come.

5.1 SAFETY AUDITING: IATA OPERATIONAL SAFETY AUDIT (IOSA)

5.1.1 The Need for an Internationally Recognised Safety Audit System

In 2003 there were a number of accidents where it was determined that organisational factors contributed to the accident; lack of auditing featured highly. This was described more fully in Chapter 4.

Every airline is subject to a level of safety oversight by its national regulator, but there are variations globally both in the standards applied, and in the capability of regulators to exercise their safety oversight as discussed in Chapter 4. Additionally, there are many organisations and companiesthat work in the aviation safety arena, but these efforts are often fragmented or localised. In 2003, IATA launched the first-ever global operational safety audit programme. The IATA Operational Safety Audit (IOSA) is built around a common set of standards, and auditing against those standards, with a goal of increasing the level of airline safety worldwide. The audit is not an inspection of each aircraft, but more practically, a high level verification of the organisational systems and processes of an airline to deliver a safe operation. By providing this global common standard, IOSA enhances and extends the role of regulators.

IATA's 270+ Member Airlines have committed to being audited to these new common, global standards by 2006, and the audit programme is now well underway. But the benefits of IOSA are available to all airlines including, for example, charter operators, should they elect to be audited under the IOSA programme.

More than ever, as is apparent from the analysis of 2003 accidents, the airline industry needs common operational safety audit standards. IOSA provides just that. Indeed, IOSA Registration should ultimately become the new global norm to provide regulators, codeshare partners and the travelling public with a higher level of confidence in an airline's ability to deliver a safe operation. IATA strongly recommends that all airlines meet IOSA standards.

5.1.2 About the IOSA Programme

The IOSA programme is based on Standards developed by pooling the resources and expertise of airlines around the world. The result is the IOSA Standards Manual (ISM), first published in 2003. The ISM covers 8 major operational areas of an airline

- ORG — Corporate Organisation and Management System
- FLT — Flight Operations
- DSP — Operational Control — Flight Dispatch
- MNT — Aircraft Engineering and Maintenance

- CAB — Cabin Operations
- GRH — Aircraft Ground Handling
- CGO — Cargo Operations
- SEC — Operational Security

The ISM is published in order to provide the operational standards, recommended practices, and supporting information necessary for an airline to successfully prepare for an IOSA audit. It can be used as a guide for an airline when it desires to structure its operational management and control systems in conformity with the latest effective industry operational practices.

The IOSA Programme Manual (IPM), published in October 2003, contains standards that govern all aspects of the IOSA Programme for the purpose of achieving a standardised and consistent audit product. These IPM Standards are primarily applicable to IATA, Audit Organisations and airlines audited under IOSA.

The IPM is also used as a source document for the accreditation of Audit Organisations and the formulation of IOSA Agreements.

IOSA audits are conducted by Audit Organisations (AOs) accredited by IATA. For a list of AOs visit the website at www.iata.org/iosa/accreditation

5.1.3 The IOSA Oversight Committee (IOC)

Governed by the Operations Committee (OPC), the IOC's mandate is to provide oversight of the entire IOSA Programme. The IOC, which meets twice a year, is comprised of 25 IATA member airlines and 10 regulatory authorities plus observers.

IOC will:

- Develop cost-effective policies, standards and recommendations for consideration by OPC in:
  a) Matters of strategic importance to airline auditing;
  b) Specific airline auditing problems being experienced and identified by airlines;
  c) Audit Standards, activities or developments anticipated to improve aviation safety;
- Provide oversight of the IOSA Programme implementation and continued development.
- Provide quality oversight of all IOSA Standards, manuals, audit policies, training and procedures for subsequent endorsement by the OPC. This is on on-going task and is now integrated with the work of the OPC subcommittees that are providing technical feedback on the standards to the IOC. For example the SAC is now responsible to maintain sections 1, ORG — Corporate Organisation and Management System and Section 5, CAB — Cabin Operations of the IOSA Standards Manual.
- Establish the necessary means for ongoing review and revision.
- Promote IOSA policies and procedures; provide advice and support to the IATA nominated representatives involved in ICAO, Regulatory Authority, industry and all other relevant activities.
- Develop work programmes and supervise associated activities for Working Groups and Task Forces.
- Monitor and analyse world-wide developments in the field of aviation safety audits.

5.1.4 The IOSA Registry

The primary benefit of IOSA is audit sharing via the IOSA Registry. The IOSA Registry is a list of all current IOSA Operators that have successfully completed an audit under IOSA. Qualification is based on closure of all audit findings, and registration has a defined validity period, typically 24 months, before another audit is required. To see the current IOSA Registry list, go to www.iata.org/iosa/registry

5.1.5 Operations Quality Standards Audits

The Operations Quality Standards (OQS) audit programme is in its fourth and final year, to be replaced in 2005 by an entry process for new IATA members based on the IOSA audit. This process is still being defined. While the purpose of OQS was as a membership entry audit, the programme has always been focused on benefit to the airlines, especially since the majority of IATA applicants are airlines undergoing rapid development while seeking to take advantage of new or developing market possibilities and often in regions lacking mature aviation regulatory structures.

Deficiencies observed during the 2003 audit programme very much followed the pattern observed during the previous three years, with a disturbing trend seen in the lack of regulatory oversight in certain regions:

(1) Little or no regulatory control in certain regions, resulting in airlines lacking safety critical operational control systems and structures common as acceptable industry practice. In certain cases, airlines did not have any published company operational manuals or documentation;

(2) The lack of effective Quality Assurance systems covering all operational airline departments, of particular importance when key operational functions are outsourced;

(3) A wide spread lack of the understanding of the requirement for oversight of outsourced functions, particularly when not policed by the regulator;

(4) The lack of published essential operational policies;

(5) The lack of a defined system of corporate managerial accountability and responsibilities;

(6) Safety Departments again consistently lacked:

   a. A general awareness of the benefits of an effective safety culture active at all levels;

   b. Written, functional safety policies;

   c. Sufficient resources, appropriate experience and/or specialised safety training;

   d. Functional Flight Data Analysis systems;

   e. Awareness and understanding of the benefits of safety databases;

(7) A lack of the need to re-prioritise aviation security strategies and policies for the changing global security environment;

(8) A consistent lack of the awareness of the need for an Emergency Response Planning and Crisis Management policy, procedures and resources.

As a result of the audit process, several carriers requested consultancy services or follow-up audits. This function has commenced.

A benefit consistently not utilised by new IATA members is involvement in the various activities available. New member airlines are encouraged to fully exploit IATA's activities in the Safety, Flight Operations and Engineering and Maintenance Committees. These forums offer excellent opportunities for sharing information and experience.

There is a strong trend toward outsourcing the majority of operational functions. In some cases this results in a "virtual" airline. This is of particular concern since effective oversight of outsourced functions is difficult and sometime less effective.

5.1.6 Other IATA Auditing Initiatives

The principles driving IOSA (i.e. reduced numbers of audits, cost savings, improved standards) can be applied to other areas of airline operations and management.

In the case of existing audit services, along with specific recommendations for some services, the team recommended that IATA review all existing audit services and apply a "business test" to identify further potential of each service. Recognition and support should also be given to audit activities that benefit members with more limited commercial returns.

5.1.6.1 Airport Assessments

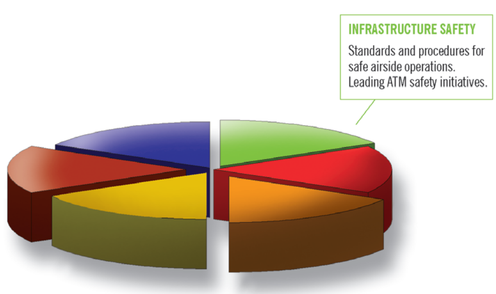
As part of the Latin America & Caribbean Regional Flight Safety Program, SO&I performs Airport Operational Assessments to assess current facilities and services, raise airline concerns and deficiencies to the authorities and obtain CAA commitment to improvements. The surveys cover most of the region's international airports and selected alternates, and it follows a standard checklist. The survey team is composed of experts from 3 or 4 carriers, Boeing and IATA. Depending on the deficiency level, some locations may require follow-up visits to assess corrective action by the authorities.

During 2003, Airport Operational Assessments were conducted in 9 airports throughout South America. All have been very successful and fully supported by the airlines. The assessments in certain airports have yielded prompt resolution of crash fire & rescue services & air traffic procedure deficiencies and runway/ taxiway surface conditions.

5.1.6.2 IATA Fuel Quality Pool

It is a regulatory requirement (JAR OPS 1 and FAR) that airport fuelling facilities be inspected and audited according to internationally accepted standards and procedures. The responsibility for the quality control oversight rests with the airlines that are required to audit the facilities every 12 months or any other interval agreed upon with the aviation authority. The airlines have recognised the benefits of pooling in this area as it not only provides them with a highly standardised quality control program, but it also enables them to achieve financial benefits through a reduction in their individual inspection workload. It is not uncommon for an airline in the pool to achieve savings up to 80%. More importantly, as evidenced by inspection reports, the quality and safety standard of many 'problem airports' have been enhanced through this programme. The IATA Fuel Quality Pool consists of 35 member airlines spread across all continents and it covers more than 600 international airports.

5.2 INFRASTRUCTURE SAFETY: AIR TRAFFIC CONTROL SAFETY



This section of the Safety Report provides an overview of key risk areas in air traffic control (ATC) and important safety initiatives undertaken in 2003 and planned in 2004.

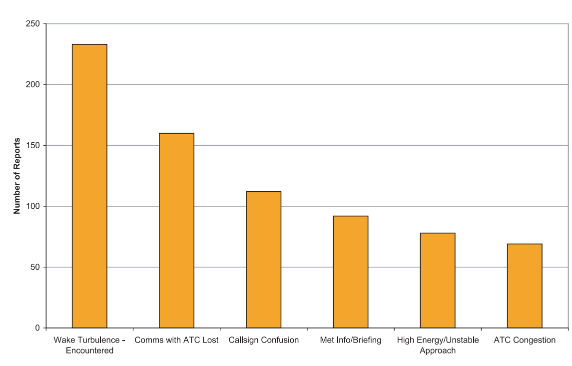
Reviewing data supplied by operators between July 2002 and June 2003, STEADES has identified a number of factors related to ATC as contributing to incidents. Wake turbulence encounters, communications difficulties and traffic congestion are recurring factors.

IATA has created an ATC Safety web site, providing links to ANSP safety web sites for the purpose of encouraging the exchange of information. Please consult www.iata.org/ps/safety/infrastructure.htm.

The air transport industry operates in a broad safety environment that encompasses Air Navigation Service Providers (ANSPs). Our airlines Members interact with over 180 ANSPs in the course of their operations.

Sharing of safety information between ANSPs, regulators, and operators is key to reducing incidents such as runway incursions, level busts, communication misunderstandings and clearance errors.

Figure 5.2.A
Selected Top ATM Incident Events



5.2.1 Pilot/Controller Collaboration

Pilots and air traffic controllers perform complex tasks, often under heavy workloads, and their responsibilities constantly overlap. Accident and incident analyses show the complex interrelationship between causal factors attributed to air traffic services and flight operations.

Accident prevention can only benefit from effective direct interaction and communication between pilots and ATC outside the cockpit, radar room and control tower.

In June 2003 the Global Aviation Information Network (GAIN) published a report on successful pilot/controller collaboration initiatives to enhance safety and efficiency of operations. Issues addressed by these initiatives include varying aircraft performance characteristics, approach procedures, cockpit automation, changes to equipment/ATC procedures, landing and runway exiting procedures, and training. Please consult www.gainweb.org.

5.2.2 ATC Safety Net

When faced with an air disaster such as controlled flight into terrain (CFIT) or a mid-air collision, we ask “how could this happen”?

When the technical inquiry into a CFIT accident or a mid-air collision shows that before impact the aircraft was airworthy, its onboard systems were operating normally and its crew was in full possession of their physical and intellectual capabilities, the question of ground-based intervention to prevent the accident arises.

CFIT and mid-air accidents can be seen as resulting from the breach of a number of defences. An ATC safety net provides an additional layer, through controller awareness and tools. It is an alert of the imminence of collision of aircraft, aircraft and terrain/obstacles, as well as penetration of dangerous airspace.

Increased ATC vigilance based on training, articulation of responsibilities and heightened situational awareness can reinforce the ATC safety net. Effective and direct interaction and communication between pilots and ATC will contribute to building this line of protection.

Automated tools provide the means for ATC to strengthen overall defences against CFIT and mid-air accidents. An example is the short-term conflict alert (STCA), which relies on the provision of reliable 4-dimensional predicted trajectories to detect potential conflicts between aircraft in the approach control areas. Other ground-based ATC safety net tools are Minimum Safe Altitude Warning (MSAW), and flight-path conformance monitor.

5.2.3 Transmission of Resolution Advisories to ATC

EUROCONTROL carried out successful trials in 2004 to assess whether the transmission of the Airborne Collision Avoidance System (ACAS) Resolution Advisory (RA) to air traffic controllers would enhance their situational awareness, working methods and capability to handle traffic. ACAS RAs are currently automatically coordinated between the aircraft involved, but air traffic controllers are only aware of RAs when given radio notification by pilots.

Interviews conducted after the trials indicated that controllers believe that RA downlink can increase their situational awareness, helping them to avoid giving inappropriate clearances and to provide better traffic information, not only to aircraft involved in RAs but also to potential third-party aircraft. RAs can be considered an additional ATC safety net.

The final report will be released mid 2004 and will include recommendations in the RA downlink area. Please consult www.eurocontrol.int.

5.2.4 Level Busts

A level bust is defined as “any unauthorized vertical deviation of more than 300 feet from an ATC flight clearance”[1]. Approximately 35% of reports to safety reporting systems are linked to level busts.

Variations in the incidence of level bust among airlines show that much can be done to reduce risk by adopting best practices and standard radio phraseology.

[1] Eurocontrol HEIDI definition

The Eurocontrol Level Bust Task Force has developed an action plan and will publish a Level Bust Toolkit in July 2004. The action plan includes recommendations in the following functional areas:

ATC

Improve the level of safety reporting & analysis.

Improve co-operation between ATC and operators in the investigation of level bust incidents

Review standard operating procedures (SOPS)

— To reduce the likelihood of level bust incidents

— To reduce the severity of the consequences of level bust incidents

- Radio Discipline
  - — Use of ICAO standard phraseology
  - — Avoid giving multiple clearances in the same transmission
- Radio Phraseology
  - — Review ICAO standard phraseology to reduce the risk of confusion between a level clearance and a heading clearance

ATM

- Review airspace & procedure design
  - — To reduce the likelihood of level bust incidents
  - — To reduce the severity of the consequences of level bust incidents

Operators

- Review SOPs to reduce the likelihood of level busts
- Reduce flight deck workload by avoiding all activity (PA calls, company calls, paperwork, etc) not directly related to the safe conduct of the flight
- Ensure clear procedures for altimeter cross-checking and approaching level calls
- Always confirm the clearance if any doubt exists on the flight deck
- Always report the level cleared to when checking in on a new frequency while in the climb or descent

The Eurocontrol report is available at:
www.eurocontrol.int/safety/downloads/NWS_LevelBust3_0305_SNT01.pdf.

5.2.5 English Language Proficiency

Inadequate English language proficiency by pilots and controllers has been identified as a causal factor in both runway incursions and incidents in controlled airspace. In March 2003, the ICAO Council adopted/approved amendments to Annexes 1, 6, 10 and PANS-ATM that strengthen provisions for the use of language for radiotelephony communications by establishing minimum skill level and testing requirements. The amendments also require the use of ICAO phraseologies as a Standard.

ICAO Annex 1 now states that as of 5 March 2008, pilots and air traffic controllers and aeronautical station operators “shall demonstrate the ability to speak and understand the language used for radiotelephony communications to the level specified... in the Appendix.”

Improved proficiency and greater adherence to a single set of phraseologies should lead to an overall safer operating environment.

IATA will help airlines to achieve the ICAO requirement in the most efficient and cost effective manner possible.

ICAO will publish guidance material in mid 2004 to support the development of training and testing programs and use of a standard language proficiency rating scale. ICAO will host a worldwide symposium on English language proficiency in Montreal in September 2004 at which IATA will participate. Please consult www.icao.int.

5.2.6 ATC Role in Preventing Runway Incursions

Runway incursions can be defined as "Any occurrence at an airport involving the unauthorized or unplanned presence of an aircraft, vehicle, or person on the protected area of a surface designated for aircraft landings and departures."[2]

In an effort to reduce the dangers associated with runway operations, an educational video-based handbook (the "toolkit") will be produced by Embry-Riddle during 2004 to raise awareness of the issue, provide basic guidance actions to reduce the risks and identify additional resources that member nations can bring to bear. The toolkit will be distributed to ICAO member nations worldwide, who will in turn provide copies to their various aviation organisations and agencies.
Please consult www.icao.int.

A European Action Plan for the Prevention of Runway Incursions was published in 2003 to investigate specific runway safety issues and to identify preventative actions.
Please consult www.eurocontrol.int/eatm/agas/runwayincursions/actionplan.html.

A 2001 Nav Canada study into runway incursions suggested that the management of the associated risk rests with the entire aviation community. Airport staff, pilots, and ATC have to work together to develop methods and procedures to avoid runway incursions.
Please consult www.navcanada.ca/contenten/news/background/2003/IncursionPrevention.asp.

The US Federal Aviation Administration (FAA) has published the *National Blueprint for Runway Safety,* containing a multi-pronged effort of outreach, training for pilots and controllers, improved runway signage and markings standards, and technology for better situational awareness of ground movements. Please consult www1.faa.gov/and/and500/520/520-links.html.

An Australian Transport Safety Bureau report on runway incursions in Australia 1997-2001 addresses four questions:

- Have runway incursions increased or decreased?
- What are the main reasons for runway incursions?
- How does Australia compare with other countries?
- Do runway incursions pose a significant risk to Australian aviation safety?

Please consult www.atsb.gov.au/public/discuss/runway_incursions.cfm.

5.2.7 ICAO Manual on Safety Management for Air Traffic Services (ATS)

ICAO provisions for ATS safety management were introduced in amendments to Annex 11 PANS-ATM in November 2001, requiring States to implement systematic and appropriate safety management programmes by November 2003.

As States will require assistance to implement safety management, ICAO has developed guidance material to be published in 2004 as the ICAO Manual on Safety Management for Air Traffic Services. It will address the basic principles of safety management including:

- Factors affecting system safety, with a particular emphasis on human error;
- Organizational issues, including responsibility and accountability for safety performance, and the need for a positive safety culture
- Safety assessment procedures
- On-going safety of the system through audits and monitoring

Please consult www.icao.int.

[2] 2001 NAV CANADA study into runway incursions

5.2.8 Implementation of EUROCONTROL Safety Regulatory Requirements (ESARRs)[3]

In November 2002, the EUROCONTROL Commission approved the EUROCONTROL Safety Regulatory Requirements (ESARRs) Implementation Monitoring and Support Programme, which aims, amongst other objectives, at addressing the Safety Regulation Commission's task of ensuring a uniform implementation of ESARRs across the European Civil Aviation Conference (ECAC) region.

In 2003, 27 States were visited for fact-finding purposes. The main conclusions so far indicate that significant progress is being made by the majority of States, and that ESARRs are, or will be, transposed into national rules either on time or up to two years after the specified applicability dates.

For some States, the transposition of ESARRs into national regulatory framework will be subject to political decisions and to availability of competent regulatory staff. Overall, ESARRs implementation suffers from lack of resources, especially in safety oversight. Recruitment and training in ATM safety regulation are a priority at national and European levels.

In some ECAC States, insufficient national resources are dedicated to the analysis of ATM safety occurrences. This makes it difficult to develop comprehensive data driven conclusions on ATM safety.

Given these constraints, the following conclusions can be drawn, based on national data collected within EUROCONTROL:

- The total number of accidents[4] has remained fairly constant since 1999, with an ATM direct contribution to accidents (either fatal or otherwise) remaining low (although, not all accident investigations have been completed yet). Although the accident report related to the mid-air collision at Überlingen is awaited so that its recommendations can be used to avoid such a tragic event happening again, a comprehensive range of safety actions has been put in hand through the EUROCONTROL Action Group for ATM Safety (AGAS), to which aviation stakeholders such as IATA participated;
- High numbers, or increasing trends with regard to a number of specific ATM occurrences, have confirmed that "collisions on the ground", "near Controlled Flight Into Terrain (CFIT)", "unauthorised penetration of airspace", "incidents involving mixed Operational Air Traffic / General Air Traffic (OAT/GAT traffic)", "Prolonged Loss of Communication" and, to a lesser degree, "level busts" should be classified as "Key Risk Areas" and need to be analysed further and/or acted upon;
- In 2002, the number of "near CFIT" occurrences has again significantly increased to levels higher than those reported in 1998 (this needs to be investigated further and could be explained by the relative decrease in actual CFIT);
- Both "unauthorised penetration of airspace" and "aircraft deviation from ATM clearance" are on a linear increasing trend. Although general aviation and civil/military interactions may represent the main areas to be investigated with regard to "unauthorised penetration of airspace", the trend appears to reflect an increase in the number of "aircraft deviation from ATM clearance" reports;
- The number of incident reports involving mixed OAT/GAT traffic is maintained proportionally higher than the normal traffic ratio between the two categories of operations and this needs to be investigated further;
- Work to investigate Prolonged Loss of Communication (PLOC) based on data provided by one European airline has so far led one European supplier of transceivers to develop a preventative equipment modification. An aircraft Service Bulletin (SB) to implement the modifications will be published in the near future. It is anticipated that this measure will significantly reduce instances of PLOC for that airline, but does not necessarily mean that all the other causes of PLOC have been fully identified. The UK CAA has conducted several test flights in specific airspace affected by PLOC, and is further investigating the signal rejection parameters of airborne receiver antennae in the context of ICAO requirements for equipment Frequency Modulation (FM) immunity;

[3] Source: EUROCONTROL Annual Safety Report 2003 (SRC Document 31, Edition 2.0)

[4] Based on published reports only

- EUROCONTROL work related to separation minima infringements in 2002 shows a levelling off of occurrences, but this will need to be confirmed over the next few years. A number of draft recommendations in the form of a Level Bust Prevention Action Plan are being finalised by EUROCONTROL;
- The trend in “runway incursions” appears to be starting to level off, but it still confirms the need to focus efforts on those mitigation measures already identified (refer to the European Action Plan for the Prevention of Runway Safety);
- EUROCONTROL has been recently and formally tasked with the establishment of a robust and centralised mechanism to analyse further those key risk areas as well as False TCAS RA.

5.2.9 US Airspace Incident Data For 2003[5]

Near Midair Collisions (NMAC):Pilot-reported NMAC reports decreased for the fourth consecutive year in 2003. NMAC incidents decreased ten percent, dropping from 180 incident reports in 2002 to 162 reports. NMAC reports decreased in all operator type categories. The number of NMAC incident reports attributed to commercial air carries (Part 121 and Part 135) decreased 2.6 percent, from 76 to 68. NMAC incident reports generated by General Aviation (Part 91) aircraft decreased 19.7 percent, from 71 to 57. Military aircraft reported NMAC incidents decreased 4.3 percent from 23 to 22.

OPERATIONAL ERROR/DEVIATIONS (OED):OE reports increased 16.4 percent, rising from 1,401 reports in 2002 to 1,212 report in 2003. En route OE reports for this period increased 1.6 percent, from 682 to 693. OE reports from terminals increased 44 percent in 2003 from the previous year, rising from 358 to 516. In 2003, Air Route Traffic Control Centres (ARTCC’s) reported error rates ranging from 0.470 to 2.541. This rate is based on error incidents per 100,000 operations. Stand-alone TRACONS established more than 5 years had rates ranging from 0.000 to 2.061. OED reports increased a significant 50 percent, rising from 180 to 270.

Pilot Deviation (PD):PD incident reports for 2003 increased 40.4 percent from the previous year, growing from 1,921 reports to 2,698 reports. PD incidents involving air related violations increased 60.6 percent from the previous year, rising from 1,398 to 2,245. Surface related PD incidents decreased 18 dropping from 552 to 453. The largest type of airspace violations was Special Use/Other airspace.

Vehicle/Pedestrian Deviations (VPD):In 2003, VPD incident reports decreased 15 percent from the previous year, dropping from 357 to 303. Incidents involving unauthorized vehicles on the runway accounted for 78.2 percent of VPD incidents.

Surface Incidents (SI):Surface Incidents for 2003 decreased 9 percent from the previous year, dropping from 1,011 to 902. SI reports attributed to PD incidents accounted for the largest percentage at 53 percent. VPD’s accounted for 33 percent of all surface incidents. OE incidents resulting in a SI accounted for 12 percent, and OD’s comprised 2 percent.

Figure 5.3.A

US Airspace Incident Data 1999 to 2003

NAS CATEGORY	1999	2000	2001	2002	2003	5-YEAR TOTAL	5-YEAR AVERAGE
NMAC	257	239	211	180	162	1049	209.8
OE	992	1138	1182	1041	1212	5565	1113
OD	276	339	232	181	269	1297	259.4
PD	1629	1900	1975	1921	2698	10123	2024.6
VPD	401	547	458	357	303	2066	413.2
SI	1048	1391	1250	1011	920	5620	1124

Note: *These data are preliminary and subject to change*

[5] Source: National Airspace Information Monitoring System, ATX-400, 1/29/2004

5.2.10 Contribution from the International Federation of Air Traffic Controllers' Associations (IFATCA)[6]

It is difficult to assess the impact of the daily task of air traffic controllers on aviation safety. While controllers are trained to provide safety as their most important contribution, meaningful data is not available to quantify their contribution. Most often, only negative results (i.e. in cases of accident and/or serious incident) are measured. Such figures must be treated with caution, as they are often incomplete.

Eurocontrol's performance report for 2002 stated that 1.7% of total fatal accidents involving aircraft greater than 2.25 tons had a direct ATM contribution.

The tragic mid-air collision in 2002 over Lake Constance and the runway incursion at Milan Linate Airport highlighted the need for greater focus on safety. After 6 years of developing new business models, ATC organisations must deeply reflect on keeping safety at the forefront. The ICAO 11th Air Navigation Conference (Sept. 2002) confirmed the need to invest more in understanding and managing safety.

With the constant drive for more ATM capacity, changes have been implemented based on new technology e.g. Area Navigation, Reduced Vertical Separation, RVSM, 8.33kHz frequencies, Mode S and data link. All promise to increase capacity and reduce controller workload — but few are proven to enhance safety.

All airspace users do not implement invariably new systems, and the onus is on ATC to ensure that the "unequipped minority" does not degrade safety. Mixed mode operations are of great concern to IFATCA. Predicted benefits in terms of capacity and workload reduction are often not realised, and system safety is tested.

Ask any controller if automation is the solution to all the problems and the answer invariably is "it will help". Engineering solutions should not be the driver of change. Solutions such as civil/military integration can have more positive impact on capacity, workload and safety.

TCAS is a classic example of politics driving a safety solution without proper evaluation. Downlinking of TCAS RAs to ATC could be the same story, if due consideration is not given to controller safety concerns.

IFATCA recognises that there are many sides to the safety argument.

IFATCA has embarked on a campaign to foster better awareness of safety matters among its membership. This will be achieved through common definitions, education information more involvement in safety initiatives launched by organisations such as ICAO, IATA, IFALPA, Eurocontrol and the FAA.

IFATCA encourages all concerned international organisations to commit to safety with actions, rather than words. One of the most important initiatives at a global level is monitoring safety with "just culture" reporting systems to ensure that incidents and trends are highlighted early, in a non-punitive manner.

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IFATCA encourages all concerned international organisations to commit to safety through action. Safety must be tackled first and foremost, and placed clearly ahead of capacity and cost issues.

[6] IFATCA is a non-political and non-industrial organisation representing more than 40000 ATCOs in 127 countries.

5.2.11 IATA Regional Initiatives on ATC Safety

In Africa, IATA has led the establishment of the AFI Safety Enhancement Team (ASET) with a view to correctly identify causes and trends and actively promote corrective actions. ASET brings together regulatory authorities, air navigation providers, airport operators, airlines and aircraft manufacturers.

In Asia Pacific, IATA has called for mandatory equipage of Mode C transponders in terminal maneuvering areas serving international airports. IATA encourages the establishment of non-punitive reporting schemes of incident occurrences, and has identified an urgent need for quality aeronautical information service (AIS), particularly in China, India and Indonesia.

In Europe, IATA has visited states and stakeholders to promote and endorse the European Action Plan for the Prevention of Runway Incursions. The plan recommends that local safety teams be established. Airlines, airports and ANSPs may receive presentations on the action plan from the IATA European Office.

In Latin America and Caribbean, improved VHF and HF communications, particularly over the Amazon basin, have eliminated the need for airlines to monitor the IATA In-flight Broadcast Procedure. IATA has worked with Chile, Ecuador and the Dominican Republic several States to implement RNAV/GNSS Procedures this year at international airports, eliminating step-down approaches and providing position awareness via moving map displays.

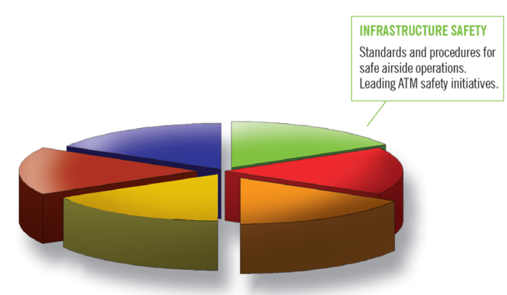
In the Middle East, ramp markings and signs deficiencies at Beirut Airport have been rectified. IATA has surveyed eight operators on bird strikes as the basis for airline input to the ICAO Airport Operations Panel. There is need for a systematic approach to safety in the region, through consolidation of efforts with ACAC/IFALPA/ACI and more safety training of senior managers.

In the North Atlantic, an occurrence of an aircraft entering oceanic airspace at the wrong flight level resulted in a NOTAM being issued to raise pilot awareness, and compulsory reporting points being introduced close to the domestic/oceanic boundary to alert controllers to aircraft altitude.

Please consult www.iata.org.

5.3 INFRASTRUCTURE SAFETY: AIRSIDE SAFETY

The development and improvement of worldwide safety standards is at the core of the work of the Airside Safety Programme and its Airside Safety Group (ASG). The ASG continues to develop and publish in the IATA Airport Handling Manual (AHM), safety practices and processes for the operating functions involved in airside activities. The AHM is a valuable resource document for all parties involved in Airport Handling activities.



To support this activity the ASG focuses on management processes that include safety management, training, safety performance audit, human factors and aircraft handling personnel qualifications and responsibilities.

Membership of the ASG, drawn from all continents, is comprised of Air Carriers, Ground Handling Companies, Airports, Airframe Manufacturers and representatives of other Safety Groups. This diversity of membership ensures the validity of material produced. The activities of the ASG in 2003 have been consistent with the strategies and goals established at the beginning of the year. The following sections present some initiatives of the ASG in 2003.

5.3.1 Passenger Baggage Weights

The manual handling of baggage is the leading cause of personnel injuries. To mitigate the risk associated with baggage handling, the ASG has recommended that there be a global standard for the maximum weight (32kg) of a single piece of baggage and that all baggage over a certain weight (23kg) be clearly identified (tagged “heavy”).

5.3.2 Prevention of Ground Damage

Damage to aircraft and property by ground equipment is a continuing source of concern. The group has undertaken a review of existing Airside operational activities to determine their validity in the current environment. The ASG will provide recommendations for change of practices as necessary. In collaboration with the ACI, the ASG has produced guidelines for an Airside Driver Training program. The intent of the programme is to define minimum standard training criteria that will enhance the global airside operational environment. The operation of passenger boarding bridges is a high-risk activity that has the potential to cause injury and/or damage to passengers, personnel, aircraft and equipment. The ASG has developed guidance material for the safe operation of boarding bridges that includes procedures and training criteria. An analysis of procedures contained in the Airport Handling Manual and concerns expressed by ACIP was conducted to determine if gaps existed. The findings, which indicated that most of the concerns were already addressed in the AHM, were forwarded onto ACIP for action.

5.3.3 Other Initiatives

The ASG has enhanced its published Safety Management System guidelines by expanding the Risk Assessment section with more comprehensive text and the inclusion of a Flow Chart and Risk Matrix. The ASG has also developed guidelines for use by organisations in the Airport Handling environment that will allow it to properly react to foreseeable emergency incidents. With FOD being an ongoing safety concern, the ASG is developing guidance material for use in the airside environment. Current aircraft pushback procedures are also being evaluated for system and safety deficiencies. These include both traditional pushbacks with a towbar and those using towbarless technology.

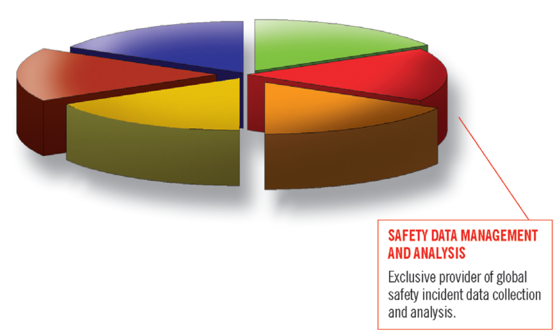
In 2001, the submitted to ICAO a proposal updating the existing (dated) published aircraft marshalling signals. The group continues to monitor the course of the proposal through the ICAO endorsement process.

Furthermore, collaborative programmes continue with other like-minded groups (i.e. IATA Aviation Fuel Working Group, ATA, AAAGSC, ACI, EAGOSH, Flight Safety Foundation and IOSA).

Refer to the CD-ROM accompanying this Safety Report for the latest newsletters from the ASG.

5.4 SAFETY DATA MANAGEMENT AND ANALYSIS

Safety Data Management & Analysis (SDMA) is one of the focal points of the new Six-point Safety Programme. Quality managers claim that without data, you are only another opinion, and the time of opinions in aviation safety has long passed.



5.4.1 The System

There are two basic parts of the safety data management and analysis system at IATA to support the airlines. The first part is obviously the technology. The second part is the policies and procedures that are applied so that the data can be handled in a secure, efficient and confidential way. IATA is currently in the process of updating the information systems surrounding its SDMA activities. There is no single database containing all the information any safety professional may be looking for, therefore IATA gathers data from a wide variety of sources. This data must be managed effectively for accuracy and reliability, and integration is one of the key areas being looked at. Indeed, the Safety With Answers Provided (SWAP) bulletin board system is currently being integrated with other Safety Data components at IATA into a single website. Another area under careful consideration is the analysis of data. IATA is currently involved with several projects that will ultimately lead to the establishment of a robust analysis system.

The policies and procedures for data management are still largely an internal document at this time. However, in the interests of promoting SMS and transparency, IATA will be publishing SDMA material in the up-coming Safety Manual.

5.4.2 The Outputs

It is no secret that many safety managers are overloaded with raw data. Added to this situation is the fact that many safety departments do not have sufficient resources to completely analyse their own data, never mind where their airline fits in with others in the global distribution. IATA heard the cry; more data would not solve anything. What airline safety managers were demanding was the information that came from that data. This is where STEADES was born.

One of the most apparent outputs of the SDMA programme at IATA is the STEADES Safety Trend Analysis report. Currently in its third issue, the report captures the latest information being gathered by the SDMA team at IATA and presents not just the hard numbers, but offers analysis that sheds insight into the raw data. It does this by analysing Air Safety Reports (ASRs) from airlines that participate in the programme. From these ASRs, trends are identified and are reported back to participants. The STEADES programme is now recognised within the safety industry as a mature and useful tool for the analysis of Air Safety Reports (ASR).

This concept is known as iSAFi, or IATA Safety Intelligence. The original STEADES concept was introduced over 6 years ago. Many things have changed since then in the air transport industry, and the ideas and priorities of that time have been superseded with new ones. Airlines that have traditionally performed all manner of tasks in-house are now outsourcing, staff reductions are a fact of life and resources in all areas are being trimmed for the sake of survival. This has led to a bold new direction for STEADES that builds on its strengths and increases its relevance and usefulness to the Safety community.

The airlines, through SAC, have been intimately involved in shaping the new direction towards an IATA Safety Intelligence System. It adopts a risk-based view of incident analysis that will assist safety managers with the difficult decision of where to put their scarce resources. iSAFi is at the same time an expansion and a transformation of STEADES, taking the best of the old and incorporating fresh ideas that will have greater impact on aviation safety.

IATA was mindful however not to undo any useful or promising work while repositioning the programme. The existing Safety Trend Analysis report was considered a key part of the formula, and has been kept fundamentally unchanged. What did change was the format and scope of the presentation. Evidence of this change can be seen in the latest STEADES report. Information is now more clearly laid out, and relevant contact information can be found at the end of each section. To ensure maximum transparency, there is a section with aggregated details about the data that is currently held in the STEADES database, and the increasing use of descriptors.

There are, however, limitations in the amount of information that can be extracted from textual reports, and the programme requires expansion into other areas of safety data management and analysis to achieve optimum effectiveness. Results from external contracts have shown that trends determined from the analysis of ASR's are complementary to the results from Flight Data Analysis (FDA) in presenting the overall picture. SAC/17 adopted the term Flight Data Analysis instead of Flight Data Monitoring to conform to ICAO nomenclature. The expansion of STEADES into an IATA Safety Intelligence system (iSAFi), including FDA, is proposed to achieve this effectiveness.

The decision to move into Flight Data Analysis is very timely, and demonstrative of IATA's attention to current industry needs. An ICAO SARP, which comes into effect on January 1, 2005, states that all operators of aircraft with a maximum take-off weight in excess of 27000kg have a FDA system as part of their accident prevention programme. Further to this regulatory requirement, market research has confirmed that such a service is needed. Therefore work is underway to put ideas into practice. Due to the high costs of operating this type of system, the planned IATA service will cater mainly to small and medium sized airlines. This will ensure that the smaller carriers are not left out once the deadline comes, and give a good start to building a company-wide SMS for those that do not already have one. It must be stressed that this is still in a proposal review stage at IATA with final go-ahead expected early in 2004. This would be an optional service and would not be a requirement for participation in iSAFi.

Key to the new iSAFi programme is the focus on risk-based reporting. After consultation with IATA member airlines, this risk-based approach broadened into suggestions of providing individually tailored benchmarking of an airline's performance in specific areas as part of a safety concierge service. This benchmarking can be carried out for both incident reports (ASRs) and FDA outputs, illustrating where the airline stands among others in the world and is where the new risk-based reporting scheme will be managed.

5.4.3 Safety Intelligence Bulletin

The IATA Safety Intelligence Bulletin, launched in August 2003 and published monthly, is a part of the iSAFi system. This publication covers accidents that have occurred in the previous month, and will highlight any trends that are deemed too important to wait until the next STEADES report. This publication is freely available for aviation safety professionals by contacting IATA.

5.5 SAFETY TRAINING

IATA is committed to Safety and strives to prevent accidents through its safety training programmes. Through IATA's Aviation Training and Development Institute (ATDI), training solutions are provided to the air transport industry. Investing in training can contribute to the enhancement of Safety by ensuring that personnel are qualified and competent to perform their duties.

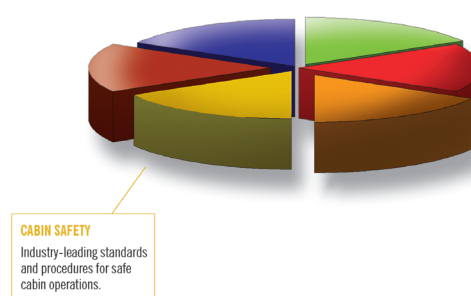
IATA offers over 30 Safety-related courses. In order to support IATA's commitment to Safety, ATDI has designed a curriculum of courses that leads towards a Safety Management Diploma. To successfully achieve the diploma, participants are required to complete a course in Safety Management Systems in addition to 3 elective courses in the areas of operations, dangerous goods, auditing and quality assurance.

Under SAC oversight, training strategies are formulated and implemented that are aligned with the Safety concerns of the industry. In an effort to reach the regions struggling for quality training, IATA is works in collaboration with the International Airline Training Fund (IATF) to deliver training to airlines in need. IATF is an independent, non-profit foundation that fosters training as a tool to enhance the knowledge and skills of the personnel from IATA Member airlines in developing countries, thus allowing them to meet their respective airlines' needs and face the challenges of the air transport industry.

Throught its ongoing relationship with airline members, ATDI will continue to enhance current products and develop new courses that can be offered internationally to improve Safety worldwide.

5.6 CABIN SAFETY

In 2003, IATA decided to integrate cabin safety as one of the six segments of its new Safety Programme. In December 2003, the cabin safety function was incorporated as a part of the Safety Department and now reports to the Safety Committee twice per year. The integration of cabin safety to the overall safety strategy emerges from the recognition that cabin crewmembers play an important role in maintaining and enhancing safety. The following section presents case studies that illustrate how the actions of the cabin crew can impact the outcome of an undesired event.



5.6.1 Review of Cabin Occurrences

Many events in commercial aviation have demonstrated the importance the cabin crew's role in normal, abnormal and emergency situations. Proper coordination and communication with the flight crew, especially during an evacuation, have dramatically impacted the outcome of some occurrences. In certain events, important information regarding an in-flight fire, aircraft de-icing or structural damage was noted by the cabin crew but never reached the flight deck. If the flight crew possessed this information, the course of action taken and the outcome of the event may have been significantly different. Handling of the post-accident environment by the cabin crew also impacted greatly on the survivability of several events. The following examples illustrate some accidents where the actions taken by the cabin crew played a significant role either as a deterrent or as a contributor to safety. On 20 December 1995, a Boeing B747-100 operated by the now defunct Tower Air, carrying 453 passengers and 15 crewmembers, veered of the runway after the Captain aborted the take-off from New York's JFK international airport. The aircraft skidded down the icy runway and came to rest 800 feet to the left of the centreline.

In this accident, critical information concerning the state of the cabin and its occupants following the rejected take-off was never relayed to the flight deck. The cabin crew witnessed structural damage to the aircraft: (an engine severed from the aircraft during the skid and the forward cabin floor displaced upwards). Passengers and cabin crew also perceived the smell of kerosene in the cabin after the aircraft came to rest. Cabin crewmembers stationed at the rear of the aircraft were not made aware of the decision not to evacuate. The Captain and the Purser gave contradictory instructions to the passengers regarding deplaning. A precautionary disembarkation was carried out. However, all this information may have impacted the Captain's decision not to carry out an evacuation. The communication breakdown between the flight deck and the cabin crewmembers and between the cabin crewmembers themselves resulted in valuable time being lost. In the event of a post-impact fire, the lack of coordination and communication could have resulted in the loss of lives.

In some accidents, the course of action taken by the cabin crew proved to be a contributor to the survival of many passengers. On July 30, 1992 a TWA Lockheed L-1011 was destroyed by fire after a rejected take-off. There were 280 passengers and 12 crewmembers on board. After the aircraft came to rest, the Captain gave the evacuation order. Off-duty cabin crew and flight crew personnel were on board and assisted in the evacuation, which was completed in less than two minutes. No fatalities were recorded and only one passenger was seriously injured, despite the fast spreading fire that destroyed the aircraft.

5.6.2 Identifying Cabin Safety Issues

The accidents and incidents of the past have underlined the importance of promoting safe cabin operating practices. The actions taken by cabin crew and the synergy of safety-related activities between the flight crew and the cabin crew can seriously alter the outcome of an event. As the airline industry evolves, it is imperative that safety issues relating to cabin operations are identified and that prevention strategies or remedial actions are taken to ensure that safety is not compromised.

The implementation of new security measures such as locked flight deck door policies creates new challenges for both the cabin and the flight crew. Existing training programmes, company procedures and contingency plans need to be evaluated and refined to ensure that the cabin crew can deal with new possible situations. The impact of technological developments, such as sophisticated In-flight Entertainment Systems and other cabin systems needs to be analysed to ensure that the cabin crew can handle any abnormality that may result from the use of these types of equipment. Passenger behaviour issues that arise from longer security checks at airports prior to boarding, restrictions on the use of portable electronic devices during flight and non-smoking policies also require new management skills on the part of the cabin crew.

The issues highlighted above are examples of some of the challenges facing the aviation safety community. However, these represent only a small part of the various issues that threaten cabin and flight safety. Due to limited resources, airlines must chose which issues will be targeted and invest in the development of prevention strategies to promote safe cabin operations. In order to prioritise safety concerns, and make well-founded decisions, airlines should base their actions on factual information and on analytical findings. IATA has chosen to aid the industry in the evaluation of cabin safety issues by adopting a data-driven approach to cabin safety.

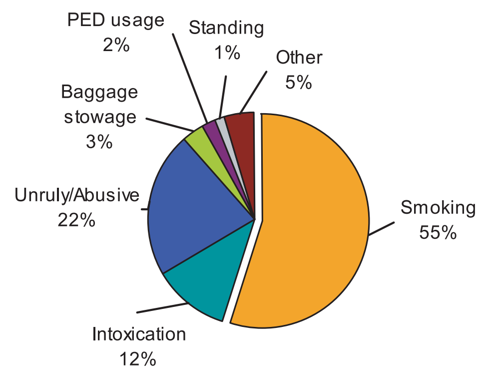
5.6.3 IATA's Data-driven Approach to Cabin Safety

IATA plays a pivotal role as the keeper of Air Safety Reports (ASRs) and Cabin Safety Reports (CSRs) from various airlines that participate in the STEADES Programme. Incident reports are a valuable source of information and their analysis can help to determine trends and areas of concern that can compromise safety. Incident analysis is a proactive method to identify precursors to accidents and provide prevention strategies that can correct operational weaknesses and enhance the safety of operations.

The analysis of cabin-related ASRs and of CSRs helps to define and comprehend safety issues. Threats concerning passenger behaviour, in-flight fires, equipment and cabin systems handling or flight crew/cabin crew communication are highlighted in these reports. Correlations can be established, for example, between aircraft type and cabin equipment deficiencies or between phases of flight and crew injuries. This type of analysis can assist airlines by determining areas of concern. Furthermore, thorough reporting of incidents can promote understanding of operational weaknesses and help to determine contributing factors (i.e. proficiency, training, etc.) that precipitate these occurrences. Based on these analytical findings, IATA can make recommendations that may be used by airlines to enhance the safety of their operations.

IATA has integrated cabin safety research into its STEADES programme and the latest issue of the STEADES Report featured a section dedicated specifically to cabin safety issues. Figure 5.6.A illustrates a breakdown passenger behaviour event for the first quarter of 2003 that was featured in the latest report. The data demonstrates that the predominant issue relating to passengers is onboard smoking. The analysis of the 700 incident reports revealed that most passengers smoked in the lavatories and that cabin crew later noticed the cigarette odour and found the stub. The disposal of cigarettes in the lavatory waste bin poses a risk to safety because they can ignite the flammable materials in the bin and produce an in-flight fire. A correlation was also established between onboard smoking occurrences and long-haul fleets. Based on these findings, recommendations were made highlighting the importance of SOPs that require pre-flight verifications of safety equipment in the lavatories by the cabin crew and frequent in-flight monitoring and inspection of lavatories especially on long-haul flights. Future STEADES Reports will also contain analytical findings, such as the preceding example, from cabin incident analysis and recommendations aimed at incident prevention and enhanced safety.

Figure 5.6.A
Passenger Behaviour Events



5.6.4 Cabin Safety Working Group Activities

The IATA Cabin Safety working Group (CSWG) is comprised of cabin safety specialists from over 30 IATA member airlines who review and develop recommended best practices for cabin operations and participate in the production of cabin safety material. The working group is responsible for the oversight of the In-flight Management Manual, which details recommended best practices for normal, abnormal and emergency situations. The manual also covers initial and recurrent training content, onboard security, occupational health and safety and cabin systems requirements.

5.6.5 IOSA and Cabin Operations Auditing

The assessment of cabin operations is a proactive tool that can help to prevent incidents and accidents. Cabin operations are reviewed as part of the IOSA process. The audit examines cabin crew training, standards and recommended best practices for normal, abnormal and emergency situations as well as requirements for cabin systems and equipment. In November 2003, the IOSA Cabin Operations Task Force was formed. The Task Force is comprised of a regionally diverse group of cabin safety specialists and auditors from IATA member airlines. Its mandate is to review and develop existing standards and recommended best practices that relate to cabin operations. The group also focuses on emerging trends or new developments that may impact the safe operation of the cabin and produce recommendations to ensure that these issues are dealt with in the auditing process.

The task force also contributes to the development of tools that will be used by auditors for data collection during the observation of cabin activities. A first draft of a supplementary checklist that will be used in conjunction with the official audit checklist has already been developed and is in the processes of being refined.

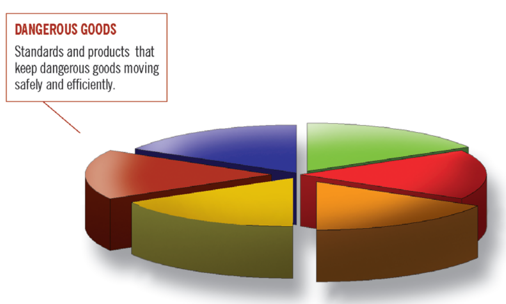
5.6.6 Viewing Cabin Operations through TEM

The University of Texas at Austin developed the threat and error management (TEM) model. IATA has applied this model to its incident and accident review processes in order to better understand threats to flight safety and errors produced by the flight crew. The Safety Department has now undertaken the adoption of the TEM model to better comprehend incidents relating to cabin operations.

When analysing cabin operations through TEM, it is important to look at errors made by cabin crew as well as all threats that are external to the cabin but which the cabin crew must manage. These threats include errors by the flight crew, unforeseen turbulence and delays on the ground and in the air. Threats are not only limited to people and their actions. Cabin systems, components and their design also create threats that the cabin crew must manage to prevent errors from occurring.
Cabin crew errors are actions taken by the crew, or lack thereof, which lead to deviations from the expectations or intentions of the cabin crew or the organisation. When cabin crew produce errors in the operational context, flight safety may be compromised.

When combined with incident data obtained from ASRs and CSRs, the TEM model provides a conceptual framework that can be employed to understand incidents and the contributing factors that played a role in their production. It is for this reason that IATA has chosen to combine the use of TEM to its STEADES cabin safety research. The CSWG will also commence to review safety issues through the TEM model to assist in the elaboration of prevention strategies.

5.7 CARGO SAFETY



IATA is constantly looking for ways to improve and enhance safety in all aspects of cargo and cargo operations. Several innovations are under development that will further promote safety and improve the conveyance of information to shippers, forwarders, handlers, passengers, and air carrier employees as well as the general public.

5.7.1 IATA Dangerous Goods Regulations (DGR)

In 1953, IATA Traffic Conferences recognised the growing need to transport by air, articles and substances having hazardous properties that, if uncontrolled, could adversely affect the safety of the passengers, crew and/or aircraft on which they are carried. Experience in other modes of transport had demonstrated that most such articles and substances could be carried safely provided that the article or substance was properly packed and the quantities in each package were properly limited. Using this experience together with the industry's knowledge of the specialised characteristics of air transport, the IATA Permanent Working Group on Restricted Articles (today the IATA Dangerous Goods Board) developed the first regulations for the transport of dangerous goods by air. The first edition of the IATA Dangerous Goods Regulations was published in 1956 as the IATA Restricted Articles Regulations.

The IATA Dangerous Goods Regulations are published in order to provide detailed procedures for shippers and the operator by which articles and substances with hazardous properties can be safely transported by air on all commercial aircraft. The IATA DGR totally reflects the requirements and intent of the International Civil Aviation Organization's (ICAO) Technical Instructions for the Safe Transport of Dangerous Goods by Air (TIs) along with incorporating specific air carrier requirement deemed necessary by IATA member airlines. This further enhances the safe transport of dangerous goods along with providing a harmonised system for operators to accept, handle and interline dangerous goods effectively and efficiently.

Prior to the inception of the ICAO TIs, many countries had adopted the IATA Restricted Articles Regulations by reference as the legal requirements for the transportation of Dangerous Goods by air in their jurisdiction.

5.7.2 Supporting the Regulations

The IATA Dangerous Goods Regulations are supported by a host of products that include, special publications, training and awareness programmes developed and maintained by a team of technical specialists. IATA also has a third party Dangerous Goods Training accreditation programme along with providing distance learning and in-house training possibilities. A team of experts provide technical, interpretive and clarification support to the DGR.

5.7.3 Continued Leadership in the Industry

The information contained in the IATA Dangerous Goods Regulations is subject to constant review in the light of changing government requirements and regulations. Changes may also come about pursuant to operational conditions inherent to air transportation. IATA does all possible to communicate these changes and revisions as they become applicable. Amendments are published as required at the IATA Dangerous Goods Web Site. www.iata.org/dangerousgoods

5.7.4 Cargo Operations

Pursuant to an increasing number of incidents and accidents in the past few years involving cargo aircraft, IATA has undertaken a project to determine if any trends in contributing factors exist in relation to these incidents and develop solutions and recommended practices where needed.

Though the absolute number of incidents and accidents is not large they do show a relatively high rate when compared to passenger/combination operations. There does seem to be a common thread through many of these incidents and accidents in that they involved non-standard operational practices relating to cargo handling and loading. A common factor in all of the cargo handling related incidents has been found to be a lack of application of published processes and procedures along with the lack of adequate training in these areas.

Based on a review of accident reports and other data, four (4) major areas of investigation and further work were identified:

- Cargo handling and preparation for transport.
- Unit Load Device (ULD) certification and serviceability.
- Weight and Balance procedures.
- Aircraft on board handling systems and loading procedures.

A gap analysis was performed reviewing all IATA operational manuals and recommended practices as well as other industry and regulatory documents. It was found that most of the information required to safely accomplish the tasks mentioned above is available in the Airport Handling Manual (AHM), the ULD Technical Manual (UTM), the Dangerous Goods Regulations (DGR) and the aircraft type's Weight and Balance Manual (WBM). In an effort to provide the industry with a comprehensive guidance IATA is in the process of collating this information into one document of recommended practices as well as developing further guidance material where gaps are deemed to exist.

In parallel with the IATA efforts in this area, the US Federal Aviation Administration (FAA) has launched a similar exercise and formed the Air Cargo Safety Implementation Plan (ACIP) Working Group with the goal of developing recommended cargo operational guidelines. These will be out for public comment in the first quarter of 2004 with completion of their work estimated for the forth quarter of 2004.

The IATA document or existing publication revisions will incorporate any ACIP recommendations where necessary, once the FAA publishes a final rule. This will ensure that industry practices are fully aligned with prevailing regulatory guidance in this area. IATA will continue to monitor further developments on this issue on an ongoing basis to ensure that the industry guidance on this subject remains current.

5.8 SAFETY AND SECURITY

The year 2002 provided somewhat of a fresh start, after the harried efforts immediately following the tragic events of 11 September 2001. While there can be no doubt, that lawmakers and regulators around the world had nothing but the best of intentions, when implementing new regulations to enhance aviation security, it became clear very early on in 2002, that many of the new measures were causing severe disruptions to what is normally a very dynamic industry.

During 2003 national authorities began to re-adjust their measures following consultation with airlines and other industry stakeholders. IATA has been a major player in this effort and was and is directly involved in many projects to represent the vision of the international air carrier community, which is that aviation security can be enhanced while at the same time not impeding the flow of passenger and cargo nor substantially disrupting airline operations.

The IATA Security Committee (SEC) is composed of 25 heads of airline security and provides advice and guidance to the industry on all matters relating to the optimisation of security measures to ensure safe, secure and efficient air transport. It develops recommendations to combat acts of unlawful interference against civil aviation in general and the airline industry in particular. The SEC has also become involved in many “aircraft security” issues where it has played either the lead or a supporting role in the development of industry positions and operational guidance on issues such as in-flight security personnel (sky marshals), enhanced security flight deck doors, flight deck door monitoring and most recently Man Portable Air Defence System (MANPADS) countermeasures.

Another security group, the IATA Cargo Security Task Force (CSTF) is composed of 10 cargo security and operations experts (5 appointee by the Cargo Services Conference (CSC) and 5 by the SEC) and was established to define airline industry positions with respect to cargo security, ensuring that security measures are efficient and cost effective. The CSTF co-ordinates its activities with SEC on issues relating to lobbying international organizations such as the International Civil Aviation Organization (ICAO), European Civil Aviation Conference (ECAC)/ European Union (EU) and national regulatory bodies and is actively involved in the implementation of harmonized world-wide cargo security standards based on ICAO Annex 17 — Security and IATA CSC Recommended Practice 1630 — Cargo Security.

In order to respond to the terrible events of “9/11”, it was clear that industry wide co-operation would be required. To that end IATA and other industry organisations joined forces to form the Global Aviation Security Action Group (GASAG) in late September 2001. Partners in GASAG include:IATA, Airline regional Associations, International Air Carriers Association (IACA), Airports Council International (ACI), the International Federation of Airline Pilots Associations (IFALPA), International Transport Workers Federation (ITF) and Airbus, with Boeing, ICAO and INTERPOL participating and providing input as observers. Since is establishment, GASAG partners has been working with governments in order to ensure that security measures are “effective, globally harmonised and operationally manageable.” The positions of GASAG on various aviation security issues are contained in the supporting documents on the CD-ROM accompanying this Safety Report.

The mission of GASAG is “to co-ordinate the global aviation industry’s input to achieve an effective world-wide security system and ensure public confidence in civil aviation.” The IATA Security Section, in addition to providing management and administrative support for GASAG, has performed a similar task within IATA. The breadth of new regulations has meant that the Security Section has needed input and expertise of many other Departments within IATA in order to serve our Member airlines.

For example, the Operations and the Safety Departments have been participating on the industry work on enhanced security flight deck doors, flight deck door monitoring, MANPADS as well as the development of a Security Management System (SMS) that is very much based on the principles of existing safety Management Systems.

The Airport Development Department has been called upon to assist in developing guidance on facilitating passenger flow through enhanced security screening at airports as well as assisting in the development of an industry position on 100% hold baggage screening (HBS) systems. The IATA position on 100% HBS is also fully harmonised with that of the Airports Council International (ACI) which developed the base document upon which the airline industry position was built.

The IATA Simplifying Passenger Travel (SPT) and Facilitation Section have been busy encouraging the establishment of trials around the world to test the use of biometric technologies to speed the flow of passenger through border control (customs and immigration) formalities as well as looking at the application of these systems in enhancing aviation security. This will ultimately improve passenger flow at airport terminal, reduce the so-called hassle factor which is keeping many passengers away from flying and re-instate confidence in air travel. No doubt the pilot projects taking place throughout the world right now are being carefully observed by all interested parties. IATA has always fully supported the promotion and implementation of global biometric techniques that enhance aviation security and promote passenger convenience.

Jointly with the Cargo Department much work has been undertaken by the CSTF to overcome restrictions on the movement of cargo and mail on passenger aircraft and avoiding measures that would have made the carriage of air cargo on passenger aircraft impossible substantially damaging the financial viability not only of the air cargo industry but also of the economy in general. Cargo security will be a major issue for IATA in 2004 and we have a goal to work with regulators to enhance cargo security measures in a practical way in order to restore the flow of cargo and mail to pre “9/11”. Major initiatives to enhanced cargo and supply chain security are underway in the United States, Canada and Europe as well a certain other States around the world.

During 2003, in addition to its work on regulatory issues the IATA Security Section, SEC and CSTF were involved in numerous projects to provide operational guidance material and other services to the airline industry and other stakeholders. These projects included the development of an Industry Aviation Security Risk Management Matrix, the development of an Airport Aviation Security Measures Benchmarking Protocol, Crew Layover Procedures Protocol, Industry Guidance on Implementation of 100% Hold Baggage Screening Systems, In Flight Security Training and Operational Procedures Protocol and Industry Passenger Risk Assessment Guidance. Additionally these groups were involved in ongoing work to ensure that the IATA Operational Safety Audit (IOSA) standards and guidance material for Operational Security and numerous IATA security-training courses were kept up-to-date from a technical perspective.

The year 2003 represented an important period where both the industry and regulators tried to find common ground and more practical solutions to enhance aviation security in the post-“9/11” world. This process of industry and government working together provided travellers and cargo shippers with increased security all while further reducing disruptions within the air transport industry. However, as threats and risks keep changing, the industry and the regulators will have to continue to pay attention to both security and passenger and cargo flow concerns and IATA intends to continue to play a major role in this process.

CHAPTER 6 — CONCLUSION AND PREVENTION STRATEGIES

6.1 CONCLUSION

Through safety successes, contemporary aviation has been transformed into an ultra-safe system, which is defined by experiencing less than one accident per million departures. Technology, human factors and risk management, Safety Management Systems, change management, engineering reliability and maintainability were the foundations of the prevention strategies that contributed to reducing the accident rate down from 1.19 per million departures in 1993 to 0.68 in 2003.

Still, preliminary analysis of the 2003 accidents demonstrates that these successes should now be focused on distinct sub-systems that exist in the overall system of the international air transport industry. On one hand, North America, Europe, the Middle East and Asia Pacific have seen a significant reduction of the accident rate during the past decade and continued to show improvement in 2003. On the other hand, the sub-system that exists in the developing world (including but not limited to the African continent) requires regionally targeted initiatives that differ from those employed in the other part of the world. Therefore, strategies used to drive the accident rate down in the developed sectors of the industry vary from those needed in the developing sectors.

These initiatives should include investing in airport infrastructure, developing radar systems, enforcing sound operational practices and implementing specific training, checking and auditing programmes. Analysis of the 2003 accidents in the African region, as well as in Latin America, highlighted deficiencies in the aspects cited above and reflect the need to take action.

In the other regions of the world that experienced fewer numbers of accidents, efforts to promote safety should take on new forms. A data-driven approach can aid the improvement of safety in these regions by addressing specific concerns. Data analysis can help unlock latent deficiencies that may result in an accident. This data can be obtained through non-punitive, confidential reporting systems, electronic normal operations data capture systems or direct observation normal data systems.

Human and organisational factors remain at the forefront of safety concerns as evidenced in the classifications of the accidents that occurred in 2003. Important work should be carried out to gain a better understanding of the factors that influence and lead to poor operational decisions.

As IATA and its members look onto 2004, regional initiatives will continue to be pursued to promote and enhance safety in different parts of the world by applying an integrated but customised method. Utilising its safety resources, such as IOSA, STEADES SAC with all its working groups, and supported by its Multidivisional Safety Task Force, IATA will continue to collect and analyse data, determine trends, assess the quality of operations and determine areas of concern with the view to develop prevention strategies to assist the air transport industry. All this aligns with IATA's constant drive to reduce the accident rate.

6.2 PREVENTION STRATEGIES

As a result of the analysis of the accidents that occurred in 2003, a number of prevention strategies were highlighted and are listed in full at Annex 3. However, priority is given to the following:

Operational Decisions

Corporate management should actively support and recognise conservative operational decisions by flight crews. This can be reflected in the airline's commitment for effective safety programmes including non-punitive Go-around policies. SOPs should be reviewed by Flight Standards as necessary, to verify that they include explicit information as to elements of operational risk associated to specific operational environments, phases of flight, and aircraft types as well as clear procedural guidelines for alternative courses of action. SAC will convene a task force to analyse Go-around mindedness using STEADES analysis of operational decision errors.

Maintenance and Technical Failures

Accidents featuring technical failures were often a combination of the precipitant technical failure and the handling of the technical failure by the flight crew. Efforts should be regionally targeted at auditing company maintenance (i.e. through the use of IOSA), developing human factors training in maintenance, using the TEM model and improving flight crew training for handling technical failures. These efforts should focus particularly on turboprop operations. In light of the technical factors that contributed to fatal accidents predominant during initial climb STEADES will analyse incidents featuring technical failures to better comprehend how crews handle these failures.

Regional Safety

IATA will maintain focus on regional initiatives in Africa and South America, with a particular focus on infrastructure and regulatory oversight. The Safety Committee will contribute to this effort by establishing a Task Force to influence, in both established and innovative ways, the role of governments, regulators and air carriers in safety management. IATA will continue to campaign for the implementation of SMSS and also support SMS throughout the aviation community and will highlight the need to have Safety Management Systems in place that encourage open reporting in a non-punitive environment, particularly in Africa. Alongside SMS, IOSA will be a vital tol in IATA's drive to prevent accidents.

Approach and Landing (ALA) Accidents and CFIT

IATA will continue to highlight the need to integrate a stable approach policy as a part of air carriers' SOPs. Airlines and regulators should work together towards eliminating step-down approaches. The use of procedures to establish a Constant Descent Angle (CDA) Approach is recommended. IATA will continue to promote fitting aircraft with E-GPWS and campaign for IATA member airlines to upgrade their systems as early as possible.

Cargo Safety and Ferry Flights

Airline management should emphasise that flights without passengers are to be performed to the same operating standards as flights with passengers. IATA will continue to develop and promote its IOSA programme to assess cargo operations and will pursue regionally targeted efforts to improve cargo operational safety.

Accident Prevention

Inherent in these prevention strategies is the data-driven approach within a sound SMS and the use of operational safety auditing as a powerful antidote to safety threats. Certainly from this analysis of the 2003 accidents, IOSA is seen as the primary tool in IATA's commitment to prevent accidents.

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.

  Note 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.

  Note 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)*

Inflight 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 — Inflight (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 crew member 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 substantially damaged and is not subsequently repaired for whatever reason including a financial decision of the owner.

IATA Accident Classifications: Classifications are groupings of factors attributable to accidents. They have been devised to help airlines develop training programmes for flight crew, cabin staff and other airline employees. These classifications can help identify the main areas of concern where prevention strategies should be developed.

IATA accident classifications are arranged in five categories: human, technical, environmental, organisational, and insufficient data. Each category (excepting the last) is further subdivided into more specifically identified factors.

It is generally difficult to classify accidents or incidents in only one category because they are often the result of a combination of different factors. Therefore, a single event may be classified under more than one category and within each category, one or more factors.

Human (HUM): The Human (HUM) category relates only to the involved flight crew. However, equivalent human performance implications are also present in the technical, environmental and operational areas. For example, H2 factor may be consequence of deficiencies in training management (O2) or standards, checking and auditing (O3). Likewise, H5 may be a consequence of deficiencies in safety management (O1) or standards, checking and auditing (O3).

CODE	DESCRIPTION	EXAMPLE EVENT(S)
H1	Intentional non-compliance	Deliberate deviation from operator procedures and/or regulations. Examples may include performing checklists from memory or intentional disregard of operational limitations or SOPs.
H2	Proficiency	Performance failures due to deficient knowledge or skills. This may be exacerbated by lack of experience, knowledge or training. Examples may 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	Operational decision	A course of action by the flight crew that compromises safety. This category may typically include the following: (1), the flight crew had options within operational reason and **decided** not to take them. (2), the flight crew had time but did not use it effectively to reach or modify a decision. Examples may include a decision to fly an approach through known wind shear instead of going around, or to depart when the departure path will obviously lead through severe weather.
H4	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). Examples may include misunderstanding an altitude clearance, failure to convey relevant operational information.
H5	Procedural	Unintentional deviation in the execution of operator procedures and/or regulations. The intention is correct but the execution is flawed. It may also include situations where flight crews forget or omit relevant appropriate action. Examples may include a flight crew dialing a wrong altitude into a mode control panel, or a flight crew failing to dial an altitude in a mode control panel.
H6	Incapacitation	Flight crew member unable to perform duties due to physical or psychological impairment.

Technical (TEC): The Technical (TEC) category relates specifically to systems and components of the involved aeroplane and their suitability 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

CODE	DESCRIPTION	EXAMPLE EVENT(S)
T3	Gear and tire	Failure affecting parking, taxi, takeoff and landing.
T4	Flight controls	Failure affecting airplane 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	Company maintenance, servicing, (incl. human error)	Bogus parts, failure to complete maintenance, maintenance or repair error/oversight/inadequacy, unrecorded maintenance.
T8	Avionics	Failure in aeroplane communications system
T9	Design, manufacturer	Design shortcomings, manufacturing defect, unapproved modification
T10	Other	Performance (inability to maintain speed/height)
T11	System failure	System failure affecting flight deck information; EFIS failure; aeroplane navigational equipment; hydraulic system failure not affecting flight controls
T12	Autoflight	Autopilot disconnect

Environmental (ENV): The Environmental (ENV) category relates to the physical world in which the involved aeroplane operated and the infrastructural (other than corporate) resources 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	Ground-crew, cabin-crew, passengers	Unruly passengers, failure to see-and-avoid by ground crew, failure to perform by cabin crew; ground damage.
E4	Birds or animals / Foreign Object Damage (FOD)	Self-explanatory
E5	Airport facilities	Inadequate aerodrome support (crash, rescue capability, snow removal, sanding); failure to eliminate runway hazards; inadequate, improper, or misleading airport marking or information
E6	Ground support (Procedures, Training)	Incorrect pushback procedures; failure in ground tug; de-icing, marshalling; loading errors
E7	Navaids	Ground navigation aid malfunction, lack or unavailability.
E8	Dangerous goods	Carriage of articles or substances capable of posing a significant risk to health, safety or property when transported by air.

CODE	DESCRIPTION	EXAMPLE EVENT(S)
E9	Security	Inadequate security measures; breach of security procedures
E10	Other	Not clearly falling within another environmental category
E11	Regulatory oversight	Failure by cognisant authority to exercise regulatory oversight or lack thereof

Organisational (ORG): The organisational 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: (1) safety data collection and analysis systems; (2) voluntary confidential reporting systems; (3)safety information communication and feedback tools;
O2	Training	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, Checking and Auditing	Inadequate, incorrect, unclear or absent: (1) Standard Operating Procedures (SOPs); (2)operational instructions and /or policies; (3)company regulations; (4)controls to verify assessment of threats and/or compliance with regulations and SOPs;
O4	Communications	Structured channels of communications are absent, unused or functioning inadequately. Necessary information is not transmitted, is misinterpreted, or arrives too late.
O5	Technology and Equipment	Available safety equipment not installed. (EGPWS, predictive windshear, TCAS/ACAS, etc.)
O6	Operational planning and scheduling	Crew rostering and staffing practices; flight and duty time limitations; health and welfare issues
O7	Change Management	Inadequate oversight of change. Failure to address operational needs created by, for example expansion, or downsizing. Failure to evaluate, integrate and/ or monitor changes to established organisational practices or procedures. Consequences of mergers and acquisitions.
O8	Selection systems	Inadequate or absent selection standards
O9	Managerial environment	Management activities relating to, for example maintenance; cabin safety; dispatch; ramp etc...
O10	Other	

Insufficient Data (I): The Insufficient Data (I) 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 a level of how far 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 crew member. 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: These 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 the Take-off 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.

Note 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.

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

Western-built Jet: Commercial Jet transport aeroplane with a maximum certificated takeoff mass of more than 15,000 kg, designed 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 — 2003 ACCIDENT SUMMARY

Date	Aircraft	Operator	Location	Flight Phase	Service	Western Eastern	Jet Turboprop	Severity	Summary
8-Jan-03	Bae Avro RJ-100	Turkish Airlines	Diyarbakir Airport (DIY), Turkey	APR	DSP	Western-built	Jet	Hull Loss	Undershot VOR/DME approach, destroyed by fire.
8-Jan-03	Beech Beechcraft 1900D	Air Midwest	Charlotte-Douglas Int'l AP, North Carolina	ICL	DSP	Western-built	Turboprop	Hull Loss	Over MTOW, crashed inverted, destroyed by impact and post impact fire.
9-Jan-03	Fokker F-28 Fellowship 1000	TANS	near Chachapoyas, Peru	APR	DSP	Western-built	Jet	Hull Loss	CFIT into mountain.
12-Jan-03	Boeing Boeing 737 (NG)	Transavia Airlines	Rotterdam Airport, Netherlands	TOF	DSP	Western-built	Jet	Substantial Damage	Tail strike during take-off.
17-Jan-03	Fokker F50	Air Nostrum	Melilla Airport (MLN), Spain	LND	DSP	Western-built	Turboprop	Hull Loss	Runway excursion on landing due to burst tire.
17-Jan-03	Fokker F-28-4000	TAME Ecuador	Quito-Mariscal Sucre Int'l AP	RTO	DSP	Western-built	Jet	Hull Loss	Aborted take-off, overran runway, nose gear collapsed.
17-Jan-03	Antonov An 24	Aerocom	Ndjolé, Gabon	CRZ	Ferry	Eastern-built	Turboprop	Hull Loss	Electrical failure, loss of situational awareness led to fuel exhaustion.
17-Jan-03	Bae Jetstream 31	SAVE	Yacuiba Airport, BO	LND	DNP	Western-built	Turboprop	Substantial Damage	Overran runway during emergency landing after power loss at takeoff.
21-Jan-03	Bombardier DHC-6 Twin Otter	Era Aviation	Kipnuk Airport, Alaska USA	LND	DSP	Western-built	Turboprop	Substantial Damage	Lost directional control, hit snow bank next to runway.
23-Jan-03	Boeing B737 (JT8D)	Star Air (Indonesia)	Soekarno-Hatta AP, Indonesia	LND	DSP	Western-built	Jet	Substantial Damage	Runway excursion due to heavy rain and strong winds.
24-Jan-03	Grumman G-159 Gulfstream I	African Commuter Services	Busia, Kenya	TOF	DNP	Western-built	Turboprop	Hull Loss	Runway excursion, hit a power line and an empty house.
26-Jan-03	Boeing Boeing 737-2M9(A)	VASP Airline	Rio Branco-Pres. Medici Airport, AC (RBR), Brazil	APR	DSP	Western-built	Jet	Hull Loss	Undershoot, clipped trees on attempted go-around.
29-Jan-03	Raytheon B99	Bearskin Airlines	Pikangikum, Ont. Canada	ICL	DSP	Western-built	Turboprop	Substantial Damage	Descending turn after takeoff, hit frozen lake.
31-Jan-03	Ilyushin Il-76	Euro Asia Aviation	Baucau (East Timor)	APR	INC	Eastern-built	Jet	Hull Loss	CFIT due to cloud and fog.
31-Jan-03	Airbus A300	Onur Air	King Abdulaziz International Airport, Jeddah, Saudi Arabia	LND	DNP	Western-built	Jet	Substantial Damage	Landing with undercarriage retracted, Go Around carried out.
10-Feb-03	Antonov An 28	Enimex	Tallinn, Estonia	ICL	ISC	Eastern-built	Turboprop	Hull Loss	Engine failure, crashed shortly after takeoff.
15-Feb-03	Boeing B747-200SF	Evergreen International Airlines	Catania, IT	LND	Ferry	Western-built	Jet	Substantial Damage	Overran runway into safety zone.
19-Feb-03	Dornier Do-228-201	Star Air Aviation	KHI Airport, Pakistan	TXI	DNP	Western-built	Turboprop	Substantial Damage	Lost directional control on taxi back to gate.
6-Mar-03	Boeing B-737	Air Algerie	Tamanrasset Airport (TMR), Algeria	ICL	DSP	Western-built	Jet	Hull Loss	Engine Failure, and crashed tail first near airport, destroyed by fire.
8-Mar-03	Fokker F-27	Mountain Air Cargo	Kinston, North Carolina	LND	DNC	Western-built	Turboprop	Substantial Damage	Right main undercarriage collapsed on landing.
12-Mar-03	Boeing B747-412	Singapore Airlines	Auckland, New Zealand	TOF	ISP	Western-built	Jet	Substantial Damage	Tail strike, smoke detected on aircraft rotation.
19-Mar-03	Raytheon 1900	Ashanti Aviation	Obuasi AP, Obuasi, Ghana	RTO	DNP	Western-built	Turboprop	Hull Loss	Overran runway into deep ravine due to EFIS problem.
21-Mar-03	Airbus A321-131	Transasia Airways	Tainan Airport (TNN) (Taiwan)	LND	DSP	Western-built	Jet	Hull Loss	Runway incursion with maintenance vehicle.
21-Mar-03	Boeing B737-4B6	Royal Air Maroc	Marrakesh-Int'l AP	LND	ISP	Western-built	Jet	Substantial Damage	Runway excursion in heavy rain.
26-Mar-03	Boeing B737-400	Royal Air Maroc	OUJDA Morocco	APR	DSP	Western-built	Jet	Hull Loss	Runway excursion, nose undercarriage collapsed.
27-Mar-03	De Havilland DHC-6 Twin Otter	PT Air Regional	Gunung Mulia (Indonesia)	ECL	DSP	Western-built	Turboprop	Hull Loss	Crashed into mountain after stalling.

Date	Aircraft	Operator	Location	Flight Phase	Service	Western Eastern	Jet Turboprop	Severity	Summary
9-Apr-03	Shorts SH 330	Skyway Enterprise	Du Boise, Pennsylvania, USA	APR	DNC	Western-built	Turboprop	Hull Loss	Left engine surged on final approach, aircraft crashed short of threshold.
9-Apr-03	Yakolev Yak-40	Uzbekistan Airways	Urgench Airport, UZ	TOF	DSP	Eastern-built	Jet	Substantial Damage	Runway excursion and undercarriage collapse after aborted takeoff.
11-Apr-03	Antonov An 12	Zapolyarye Ailines	Srendy AP, Russia	APR	DNC	Eastern-built	Turboprop	Substantial Damage	Undershot runway on final approach.
15-Apr-03	Fairchild (Swearingen) Metro	Superior Aviation	Denver Int'l AP, USA	LND	DNC	Western-built	Turboprop	Hull Loss	Landed with undercarriage retracted and crashed onto runway.
15-Apr-03	Bae Viscount	Trans Int Air	Unknown, DR Congo	TOF	Ferry	Western-built	Turboprop	Hull Loss	Engine failure on 3-engine takeoff.
18-Apr-03	McDonnell Douglas DC-9	Wetrafa Airlift	Brazzaville, Congo	LND	DSP	Western-built	Jet	Substantial Damage	Control input problems, landed with undercarriage retracted.
18-Apr-03	Fairchild Metro	Northern Dene Airways	Saskatoon/John G. Diefenbaker, Canada	ESD	DSP	Western-built	Turboprop	Substantial Damage	Propellers struck by baggage carts.
23-Apr-03	Raytheon Beech 99A	Transwest Air	Prince Albert, SK (Canada)	APR	DSP	Western-built	Turboprop	Hull Loss	Uncommanded pitch up, landed with undercarriage retracted in a field.
25-Apr-03	Antonov AN-24	Not reported	Beni AP, Congo	LND	DNC	Eastern-built	Turboprop	Hull Loss	Missed runway on landing.
28-Apr-03	De Havilland DHC-6 Twin Otter	PT Air Regional	Gunung Mulia (Indonesia)	APR	DNC	Western-built	Turboprop	Hull Loss	Apparetnly undershot visual approach.
28-Apr-03	Yakolev Yak-40	Dniproavia	Dnepropetrovsk International Airport, Dnepropetrovsk, Ukraine	LND	DSP	Eastern-built	Jet	Substantial Damage	Runways excursion and loss of control after touchdown.
29-Apr-03	Raytheon B1900	AVIREX	N'Djili Airport, Kinshasa, Congo (Democratic Republic)- FZAA	LND	INP	Western-built	Turboprop	Hull Loss	Crosswind experienced after touchdown, runway excursion.
8-May-03	Ilyushin Il-76	Ukrainian Cargo Airlines	in flight, between Kinshasa and Lubumbashi, DR Congo	CRZ	DNP	Eastern-built	Jet		Passengers sucked out of rear of aircraft.
24-May-03	Boeing B737	Southwest Airlines	Amarillo International Airport	LND	DSP	Western-built	Jet	Substantial Damage	Loss of control after touchdown, nose gear collapsed.
26-May-03	Yakolev Yak-42D	UM Air (Ukrainian-Mediterranean)	Trabzon (Turkey)	APR	INP	Eastern-built	Jet	Hull Loss	CFIT during second approach attempt.
26-May-03	Airbus A321-230	British Midland	in flight, Hungary	CRZ	INP	Western-built	Jet	Substantial Damage	Experienced severe turbulence and hail during cruise.
27-May-03	Antonov An 12	SHOWA AIR	Goma, Congo	LND	INC	Eastern-built	Turboprop	Hull Loss	Touchdown beyond threshold and overran runway due to strong tail wind.
14-Jun-03	Antonov An 24	Cubana Airlines	Gerona, Rafael Cabrera A/P, Cuba	LND	ISP	Eastern-built	Turboprop	Substantial Damage	Propeller auto-feathered after take off, on return the aircraft overran the runway and the left undercarriage collapsed.
14-Jun-03	Boeing B747	MK Airlines	in flight, (near) Luxembourg, LX	DST	INC	Western-built	Jet	Substantial Damage	Encountered hail storm, landed safety.
16-Jun-03	Airbus A320-231	My Travel Airways	Bristol-Int'l AP / England	LND	INP	Western-built	Jet	Substantial Damage	Tail strike on landing.
16-Jun-03	Fokker F50	MID AIRLINES	Adaryale, Sudan	LND	DNP	Western-built	Turboprop	Hull Loss	Runway excursion after touchdown, left propeller stuck runway shoulder, damage to fuselage.
17-Jun-03	McDonnell Douglas MD-80	Onur Air	Groningen-Eelde Airport (GRQ) (Netherlands)	RTO	DNP	Western-built	Jet	Substantial Damage	Overran runway, nose undercarriage collapsed.
22-Jun-03	Bombardier Canadair Regional Jet 100ER	Brit Air	Brest, FR	APR	DSP	Western-built	Jet	Hull Loss	Aircraft undershot during final approach, destroyed by fire.NP
30-Jun-03	Yakolev Yak-40	CNG Transavia	Solovki AP, Russia	LND	Ferry	Eastern-built	Jet	Substantial Damage	Runway excursion after undershoot on previous landing attempt.

Date	Aircraft	Operator	Location	Flight Phase	Service	Western Eastern	Jet Turboprop	Severity	Summary
2-Jul-03	Boeing B737-800	Kibris Turkish Airlines	Famagusta, CY	PRF	INP	Western-built	Jet	Substantial Damage	Damaged by a belt loaded.
6-Jul-03	McDonnell Douglas DC-10-30F	Cielos del Peru	Curitiba-Afonso Pena Airport, PR (CWB) (Brazil)	LND	INC	Western-built	Jet	Substantial Damage	Overran runway due to heavy rain.
8-Jul-03	Boeing B737-2J8C(A)	Sudan Airways	Port Sudan Airport, Sudan	GOA	DSP	Western-built	Jet	Hull Loss	Engine problems on takeoff, crashed during second emergency landing attempt.
11-Jul-03	Boeing B707-300	Air Memphis	Dhaka-Zia International Airport (DAC) (Bangladesh)	RTO	Ferry	Western-built	Jet	Hull Loss	Runway excursion during 3-engine ferry takeoff.
19-Jul-03	Fairchild Metro	Ryan Blake Air Charter	Mount Kenya (Kenya)	CRZ	DSP	Western-built	Turboprop	Hull Loss	CFIT into mountain.
20-Jul-03	Tupolev TU 154	Aeroflot Russian Airlines	(in flight) Germany	ECL	ISP	Eastern-built	Jet	Substantial Damage	Encountered severe hail storm, landed safety.
11-Aug-03	Fokker F28	Garuda Indonesia	Soekarno-Hatta International Airport, Jakarta, ID	LND	DSP	Western-built	Jet	Substantial Damage	Collapse of undercarriage when landing.
13-Aug-03	Let L-410 Turbolet	Lexus Aviation	Rumbek AP, Sudan	LND	INP	Eastern-built	Turboprop	Hull Loss	Landed long and overran due to animal on runway.
15-Aug-03	Boeing B737-300	EasyJet Switzerland	Geneva, Switzerland	ECL	DSP	Western-built	Jet	Substantial Damage	Encountered hail storm, landed safety.
24-Aug-03	Let L 410U VP-E	Tropical Airways D'Haiti	Cap Haitien Airport (CAP), Haiti	ICL	DSP	Eastern-built	Turboprop	Hull Loss	Nose baggage door opened at takeoff, contents impacted with propellers on return to airfield, loss of control.
24-Aug-03	Raytheon Raytheon 99	Keystone Air Service	Kaskattama Airport, Manitoba, Canada	LND	DNP	Western-built	Turboprop	Substantial Damage	Hit a bump in the runway, right main undercarriage collapsed.
26-Aug-03	Raytheon Beechcraft 1900-D	Colgan Air	Cod	ICL	Ferry	Western-built	Turboprop	Hull Loss	Loss of control after take off, crashed into the water.
3-Sep-03	Bombardier DHC-6 Twin Otter	West Coast Air	Vancouver, BC, Canada	TXO	DSP	Western-built	Turboprop	Substantial Damage	Aircraft collided with a dock ripping off the left float.
14-Sep-03	Let L-410 Turbolet	ACS Ltd	Langkien, Sudan	RTO	INP	Eastern-built	Turboprop	Hull Loss	Overran runway on aborted takeoff due to animal incursion.
17-Sep-03	Bae Jetstream 31	European Executive Express	Lulea-Kallax AP, Sweden	APR	DSP	Western-built	Turboprop	Hull Loss	Directional control lost on hard touchdown.
17-Sep-03	Bae Jetstream 31	EASTERN AIRWAYS	Wick, UK	LND	DSP	Western-built	Turboprop	Hull Loss	Multiple hard touchdowns encountered on landing.
24-Sep-03	Embraer ERJ-145	Luxair S.A.	Luxembourg-Findel Airport	LND	ISP	Western-built	Jet	Substantial Damage	Directional control lost after touchdown, collidded into a fence.
24-Sep-03	Antonov AN 12	Sarit Airlines	Wau AP, Sudan	LND	DNC	Eastern-built	Turboprop	Hull Loss	Nose and left undercarriage collapsed after touchdown.
1-Oct-03	Boeing B747	Cargo Air Lines	Liege-Bierset Airport, Belgium	LND	ISC	Western-built	Jet	Substantial Damage	Overran runway and hit localizer antenna.
3-Oct-03	Convair CV-580	Air Freight NZ	Sea Off Kapiti Coast, New Zealand	DST	DSC	Western-built	Turboprop	Hull Loss	Crashed into sea due to poor weather.
3-Oct-03	Boeing B737-500	Garuda Indonesia	Semarang, ID	LND	DSP	Western-built	Jet	Substantial Damage	Aircraft landed, continued left of the runway and the nose wheel collapsed after hitting a concrete base.
5-Oct-03	Airbus A330-240 (RR)	Edelweiss Air	Miami, FL, USA	ECL	ISP	Western-built	Jet	Substantial Damage	Engine suffered uncontained failure, landed safety.
26-Oct-03	Fairchild FH-227B	CATA Linea Aérea	Buenos Aires, Argentina	ICL	DNC	Western-built	Turboprop	Hull Loss	Aircraft crashed while attempting to return to airport.
1-Nov-03	Airbus A321-230 (IAE)	Egypt Air	Domodedovo AP, Moscow	LND	Ferry	Western-built	Jet	Substantial Damage	Directional control was lost on landing resulting in a runway excursion.
6-Nov-03	Airbus A320-230	TAM Linhas Aereas	Florianopolis AP, Brasil	LND	DSP	Western-built	Jet	Substantial Damage	Aircraft encountered heavy rain and wind, nose undercarriage collapsed.

Date	Aircraft	Operator	Location	Flight Phase	Service	Western Eastern	Jet Turboprop	Severity	Summary
8-Nov-03	Bombardier (Shorts) SC. 7 Skyvan 3M-100	Trans Guyana Airways	near Ogle, Guyana	ICL	DNP	Western-built	Turboprop	Hull Loss	Right engine failed and a forced landing was carried out in a field.
17-Nov-03	Antonov An-12	Sarit Airlines	Wau, Sudan	APR	DNC	Eastern-built	Turboprop	Hull Loss	Crashed on final approach and destroyed.
18-Nov-03	Fairchild (Swearingen) Sa 227 III	Key Lime Air Corp.	Grand Junction, Colorado	LND	DSC	Western-built	Turboprop	Hull Loss	Landed with nose undercarriage retracted.
25-Nov-03	ATR ATR-72	Jet Airways	Mumbai, India	LND	DSP	Western-built	Turboprop	Substantial Damage	Veered left after touchdown resulting in a runway excursion.
28-Nov-03	Airbus A340-600	Cathay Pacific	Kingsford Smith Airport, Sydney, New South Wales, Australia	LND	ISP	Western-built	Jet	Substantial Damage	Hard Landing limit exceeded.
29-Nov-03	Boeing B747-258C	Hydro Air Cargo	Lagos-Murtala Muhammed Airport, Nigeria	LND	INC	Western-built	Jet	Substantial Damage	Aircraft landed on closed runway and hit obstructions.
3-Dec-03	Fairchild (Swearingen) Metro	Key Lime Air	Denver Int'l AP, Colorado	TXO	DNC	Western-built	Turboprop	Substantial Damage	Ground collision with aircraft while taxiing.
3-Dec-03	Fairchild (Swearingen) SA226-TC	Key Lime Air	Denver Int'l AP, Colorado	TXO	DNC	Western-built	Turboprop	Hull Loss	Ground collision with aircraft while taxiing.
4-Dec-03	Dornier 228-202	Kato Air	Bod Airport (BOO) (Norway)	APR	DSP	Western-built	Turboprop	Hull Loss	Undershot during second approach in poor weather.
7-Dec-03	Fokker F28	East Africa Safari Air	Lokichoggio airstrip, Kenya	LND	DSP	Western-built	Jet	Hull Loss	Overran runway in heavy rain.
8-Dec-03	Boeing B747	Asiana Airlines	Frankfurt Airport, Germany	TXI	ISC	Western-built	Jet	Substantial Damage	Landing gear fell into access pit after landing.
18-Dec-03	McDonnell Douglas DC-10	FedEx	Memphis Int'l AP (MEM)	LND	DSC	Western-built	Jet	Hull Loss	Runway excursion after undercarriage collapsed on landing, destroyed by fire.
18-Dec-03	McDonnell Douglas DC-9	LAS Colombia	near Mitu, Colombia	DST	DNC	Western-built	Jet	Hull Loss	Radar contact was lost during initial approach.
19-Dec-03	Boeing 737-3Y0	Air Gabon	Libreville AP, Gabon	LND	DSP	Western-built	Jet	Hull Loss	Overran runway in poor weather.
20-Dec-03	Boeing B737-76N	GOL Linhas Aereas	Navegantes AP, Brazil	LND	DSP	Western-built	Jet	Substantial Damage	Overran runway in poor weather and hit a concrete wall.
22-Dec-03	Boeing B737-700	EasyJet	Amsterdam-Schiphol	TXO	ISP	Western-built	Jet	Substantial Damage	Left wing struck light tower while taxiing.
25-Dec-03	Boeing B727-223	UTA Guinee	Cotonou AP, Benin	ICL	ISP	Western-built	Jet	Hull Loss	Failed to climb on takeoff, main undercarriage and tail skid hit low building.

ANNEX 3 — PREVENTION STRATEGIES

As a result of the analysis of the accident that occurred in 2003, the following prevention strategies were developed:

Regional Safety:

1. *The Safety Committee (SAC) to establish a Task Force to influence, in both established and innovative ways, the role of governments, regulators and air carriers in safety management. IATA will enlist the support of member airlines that operate in and into Africa.*

Data collection and Classification:

2. *IATA will continue to highlight the need to have Safety Management Systems in place that encourage open reporting in a non-punitive environment.*

Contributory Factors for Western-built Aircraft:

3. *IATA will continue to campaign for the implementation of SMSS and also supports SMS throughout the aviation community.*
4. *HFWG will continue its work on human factors to understand better their participation in incidents and accidents and to develop tools and prevention strategies to manage human error. This is highlighted by findings that link human factors to a large number of accidents produced in 2003.*
5. *IATA will maintain focus on regional initiatives in Africa and South America, with a particular focus on infrastructure and regulatory oversight.*
6. *Air carriers and regulators in North America should address airworthiness and maintenance issues among Western-built Turboprop fleets.*
7. *IATA will monitor incidents and accidents that occur in initial climb, with a particular focus on the technical issues that precipitate them and the handling of these events by flight crews. This recommendation is made in light of the fact that most fatal accidents in 2003 occurred during initial climb.*

Contributory Factors for Eastern-built Aircraft:

8. *IATA will coordinate efforts with Eastern-built aircraft operators to understand better the operational environment these aircraft operate in and the threats that are associated with it.*
9. *HFWG will pursue research into human factors in Eastern-built aircraft, as they are significant contributors in accidents involving these aircraft, particularly Jets.*
10. *IATA will campaign for regional initiatives into airworthiness and maintenance issues with a particular focus on Eastern-built Turboprop operations.*

Cargo Safety and Flights without Passengers:

11. *IATA will continue to develop and promote its IOSA programme to assess cargo operations.*
12. *As part of the on-going effort to enhance Safety in Africa, IATA will give particular attention to cargo operations in this region.*
13. *IATA will monitor Western-built Turboprop cargo aircraft operations with a particular focus on airworthiness and maintenance issues.*
14. *IATA will campaign for the implementation of SMS to target specifically Eastern-built cargo aircraft operations, particularly in Africa.*

Fatal Accidents:

15. *IATA will pursue joint efforts with Eastern-built aircraft operators to understand better operational weakness that led to fatal accidents. A special focus should be placed on human factors and their contribution to these events.*
16. *Airlines and IATA will coordinate their efforts to promote Safety among Western-built Turboprop operators, with a particular focus on technical issues due to their noticeable presence in these events in comparison to Western-built Jet operations.*

Approach and Landing (ALA) Accidents:

17. *IATA will continue to highlight the need to integrate a stable approach policy as a part of air carriers' SOPs.*

18. *The inherent dangers of non-precision approaches are often overlooked especially if the procedure involves a step down on final. The use of procedures to establish a Constant Descent Angle (CDA) Approach is recommended.*

19. *IATA will specify the need to have management responsibility and commitment for effective safety programmes including non-punitive Go-around policies.*

20. *SAC will convene a task force to analyse Go-around mindedness.*

Controlled Flight Into Terrain (CFIT):

21. *Organisations should develop explicit SOPs, based on the CFIT/ALAR Toolkit to counter CFIT accidents, which are tailored to their operational environment and verify adherence to their procedures.*

22. *IATA will continue to promote fitting aircraft with E-GPWS and campaign for IATA member airlines to upgrade their systems as early as possible.*

23. *Airlines and regulators should work together towards eliminating step-down approaches.*

Operational Decisions:

24. *STEADES will perform analysis of operational decision errors.*

25. *Firstly, corporate management should actively support and recognise conservative operational decisions by flight crews. This is particularly important for operational situations that are not explicitly addressed, or unforeseen, by SOPs. Also, low visibility simulations in flight simulators would be appropriate to promote adequate Go-around decisions.*

26. *SOPs should be reviewed by Flight Standards as necessary, to verify that they include explicit information as to elements of operational risk associated to specific phases of flight, as well as clear procedural guidelines for alternative courses of action.*

27. *Training and checking should emphasise and recognise flight crew adherence to conservative operational decisions. Training and checking programmes should be audited using IOSA and LOSA.*

Maintenance and Technical Failures:

28. *IATA will promote regionally targeted, independent audits of company maintenance. This results from findings that cited poor maintenance in the majority of accidents featuring technical failures.*

29. *IATA and its HFWG will work towards applying the TEM model to maintenance to determine human factors and threats that contribute to maintenance issues.*

30. *STEADES should analyse incidents featuring technical failures to better comprehend how crews handle these failures.*

Loss of Control:

31. *IATA will focus on airworthiness and maintenance issues particularly with regards to Western-built Turboprop aircraft, in light of findings that linked these issues to loss of control events.*

32. *STEADES will conduct analysis on flight control incidents and determine contributing factors that can result in a loss of control in-flight.*

Runway Excursions:

33. *IATA will focus on regional initiatives to aid in the reduction of runway excursions in Africa.*
34. *STEADES will conduct analysis on runway excursion incidents to determine contributing factors that were associated with these events.*
35. *According to the findings from the 2003 classifications, a particular focus should be placed on human factors in runway excursions. The HFWG should look into STEADES research findings and determine threats and errors that participated in these events in order to develop prevention strategies.*

Training and Proficiency:

36. *IATA will campaign the use of IOSA to audits training programmes as necessary to ensure training, proficiency and checking standards are adequate.*
37. *Airlines should verify that procedures for dealing with engine failures in all phases of flight are included in their training programmes, and that they are not just limited to critical times such as V1.*
38. *Training programmes should provide crews with knowledge about the limitations of what weather radars cannot see. Procedures should deal with the recognition and the avoidance of severe weather including hail.*
39. *Airlines should ensure that explicit procedures are implemented for three-engine ferry operations, where company policy permits it. Flight crews should receive appropriate training for this type of operation.*
40. *Airlines should review their training programmes to ensure that First Officers are provided with adequate tools to enhance their assertiveness and promote their involvement in operational decisions.*
41. *Airlines should ensure that their SOPs mandate the use of headsets during critical phases of flight and verify that crews adhere to these policies during operations.*