Management of LOC-I in Airlines

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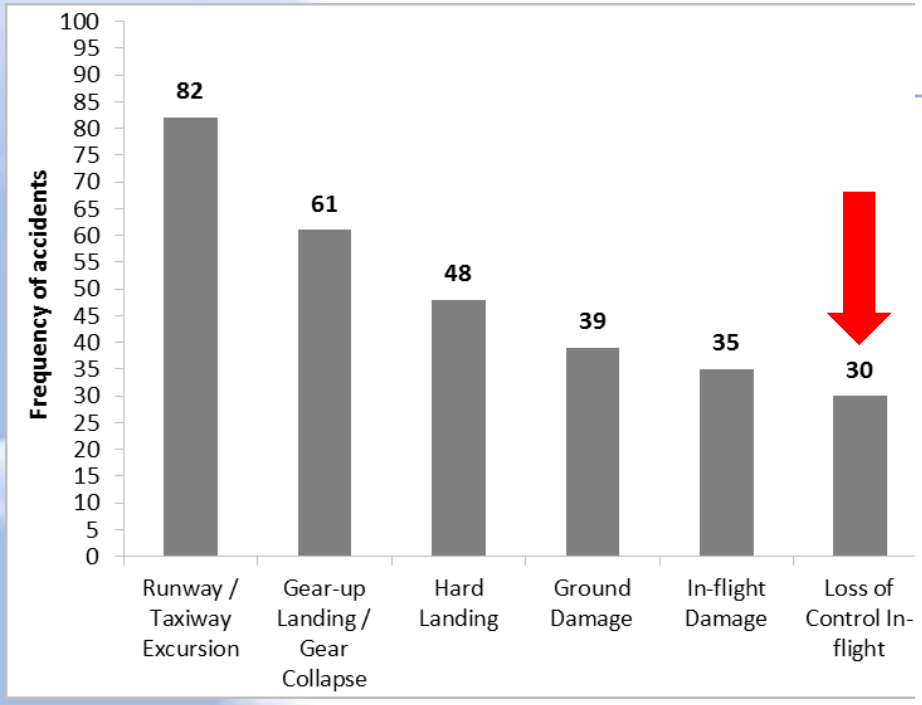
Introduction

- LOC-I refers to accidents in which the flight crew was unable to maintain control of the aircraft in flight, resulting in an unrecoverable deviation from the intended flight path.
- Loss of control in-flight (LOC-I) has been identified by the ICAO as one of three high-risk accident occurrence categories and has been one of the most significant causes of fatal accidents for many years.

Statistics Data



Accident Category	Number of Accidents	Fatal Accidents	Number of Fatalities
Loss of Control In-flight (LOC-I)	30	27	949
Controlled Flight Into Terrain (CFIT)	19	16	259
Other End State	12	4	318
Inflight Damage	35	3	86
Runway / Taxiway Excursion	82	3	14
Undershoot	12	1	7

IATA data for 2012-2016 show total 375 commercial accidents
93 percent of LOC-I accidents result in hull losses and 90 percent incur fatalities.

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Causes of LOC-I

Human Factor

- loss of Situational Awareness
  - (especially through Distraction but also through Complacency),
- Intended or unintended mishandling of the aircraft
  - (Abrupt Aircraft Control, Automation…),
- Attempted flight with total load or load distribution outside of safe limits,
- Attempting to maneuver an aircraft outside its capabilities to resolve a prior problem (including mis-navigation),
- Pilot Induced Oscillation

Causes of LOC-I

Environmental Threats

- Low level wind shear, higher level Clear Air Turbulence (CAT) or wake turbulence,
- The effects of high levels of airframe ice accumulation or a significant loss of power on all engines attributable to engine icing,
- Malicious Interference (unaccompanied explosives, external attack…)

Causes of LOC-I

Aircraft or System Problem

- Structural or multiple power plant damage
  - (Bird Strike, exposure to severe turbulence…etc),
- Fire in the Air,
- False instrument readings displayed to the flight crew,
- Loss of Power

Modern Technology

Automated system have made planes safer, but what if Pilot made wrong decision?

Air France 447 & AirAsia 8501

A section of AirAsia flight QZ8501's tail is recovered after the crash.

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Pilots becoming overdependent on technology: coroner warns

Airline pilots are becoming overdependent on technology and are in danger of losing the basic skills of flying a plane, a coroner has warned.

Wreckage of Air France flight recovered Photo: Getty Images

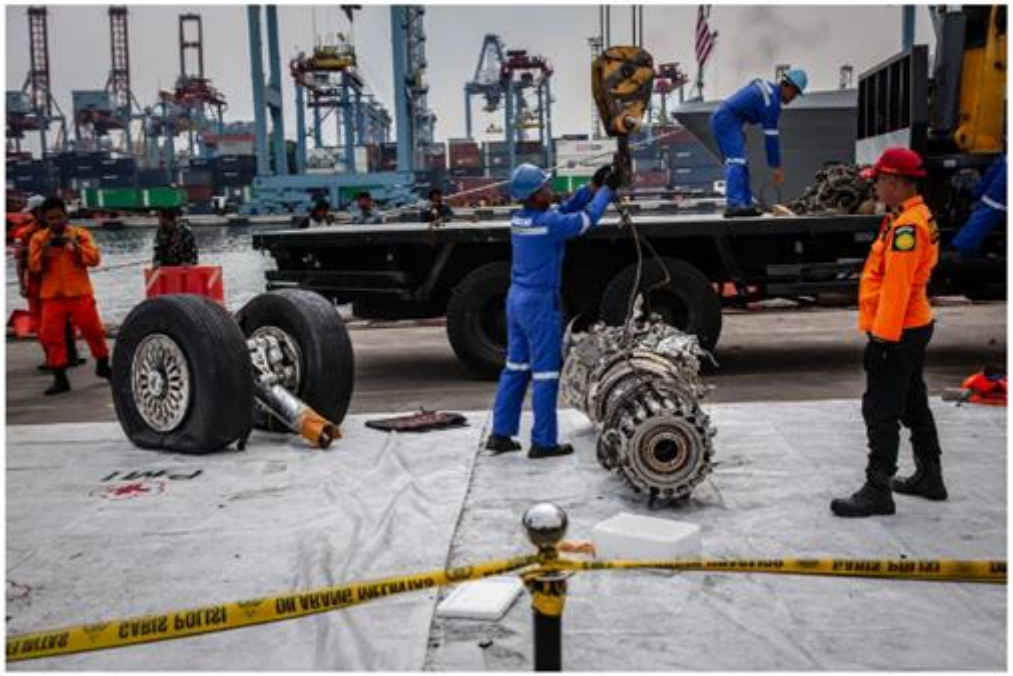
The report into last December's AirAsia crash suggests significant parallels with the Air France disaster of 2009.

In both incidents, a technical issue helped trigger a chain of events in the cockpit where the pilots' commands took the plane out of control. And on both occasions, a possibly disoriented co-pilot pulled back on his stick, pointing the nose of the plane up and putting it into a disastrous stall.

Lion Air JT610

What We Know About the Lion Air Flight 610 Crash

The new plane's automated systems may have played a role, but the precise cause remains unknown.



Indonesian rescue personnel recovered the wreckage of an engine from Lion Air Flight 610 and brought it to Tanjung Priok port in Jakarta. Ulet Ifansasti/Getty Images

Modern Technology

Automation is a great benefit for aviation safety, still need to know and have capability to the basic of stick and rudder flying.

If an automation system is in control and right most of time, pilot becomes more complacent.

Turkish Airlines TK610

Illustration 1: the Boeing 737-800 that crashed with runway 18R in the background (source: KLPD)

Despite the indications in the cockpit, the cockpit crew did not notice the too big decrease in airspeed until the approach to stall warning. With the cockpit crew - including the safety pilot - working to complete the landing checklist, no one was focusing on the primary task: monitoring the flight path and the airspeed of the aircraft. It can thus be concluded that the system based around the presence of a safety pilot on board flight TK1951 did not function effectively.

More manual flight for Asiana pilots. Asiana's automation policy emphasized the full use of all automation and did not encourage manual flight during line operations. If the PF had been provided with more opportunity to manually fly the 777 during training, he would most likely have better used pitch trim, recognized that the airspeed was decaying, and taken the appropriate corrective action of adding power. FAA guidance and a recent US regulatory change support the need for pilots to regularly perform manual flight so that their airplane handling skills do not degrade.

Management Actions

- Selection and training of pilots
- Man-Machine Interface
- Data analysis and Information dissemination

Selection and training

Appropriate screening

- Have you identified pilots which might feel extremely uncomfortable when at unusual attitudes in a real aircraft (e.g. small aerobatic aircraft) to the point where they will lose their ability to take recovery action?

- How do you make sure that your pilots are risk managers and not risk takers?

Selection and training

Training for the Unexpected

- Management should be aware of the fact that LOC-I always takes the flight crew by surprise and it is therefore essential that training includes the surprise factor .
- LOC-I can happen in all phases of flight, including the comparatively low workload cruise phase where pilots may have their seats moved back in an aft position and generally maintain a more relaxed flight deck environment.
- The basic of stick and rudder flying

Man-Machine Interface

Man-Machine Interface

- Flying requires pilots to manage distractions and workload in all phases of operation – reducing distractions on the flight deck will help to avoid accidents, including those due to LOC-I.

- Ensure that when aircraft are purchased, leased or modified, cockpit systems, controls and indicators remain consistent across the fleet.

- The complex automation and cross-connection between systems makes it difficult for pilots to identify what effect the failure of one system has on the other.

Data analysis and Information dissemination

- Can the reporting system collect and detect cases near-LOC-I?
  - Approach to stall, roll upset, Go-Around maneuvering, unstable approach, fatigue….
- Can the FOQA provide LOC-I precursor parameters(tier 3/ tier 4) and derive useful conclusions?

Data analysis and Information dissemination

LOCI	
3.10	ATB/DIV (IFSD, weather, ATC and passenger excluded)
3.11	In flight shutdown (IFSD)
3.12	Abnormal cabin pressure event
3.13	Pitch Angle High during Takeoff or Landing
3.14	In flight, aircraft take emergency or abnormal procedure due to overspeed
3.15	Incorrect loading resulted a significant influence on the aircraft weight and balance event
3.16	Failure of more than one system in a multiple-redundancy system(ATA22/29/34)
3.17	Undeclared dangerous good and dangerous good loading event
3.25	Human error related high/medium risk safety event rate
3.30	CAA regulations violation or flight safety incident attributed to crew fitigue

"SAFETY is NOT guaranteed FOREVER

It is a CONTINUOUS process"

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