LOSS OF CONTROL IN FLIGHT

GENERAL AVIATION

ICAO SYMPOSIUM

22ND – 24TH JUNE 2015

Nairobi, Kenya

ROBERT MWESIGWA NVIIRI

AG. EXECUTIVE DIRECTOR

CASSOA - UGANDA

GENERAL AVIATION DEFINITION

General Aviation (**GA**) is all non-commercial civil aviation operations (scheduled and non-scheduled air transport operations)

General aviation flights range from gliders and powered parachutes to corporate business jet flights. The majority of the world's air traffic falls into this category

General Aviation Terminal at Raleigh-Durham International Airport

BACKGROUND TO THE SITUATION

- Aviation threats evolve with time
- LOC-I currently is the largest threat to aviation safety
- Reducing LOC-I is a global aviation safety priority of ICAO and other aviation professional organizations

BACKGROUND TO THE SITUATION cont'd

- Statistically, approach to landing, maneuvering, and climb are the deadliest phases of flight for loss of control accidents
- Technology advancement can deal with CFIT and mid-air collision but not LOC-I

PROBABLE CAUSES OF LOC-I

NASA Aviation Safety Programme identifies three casual factors that contribute to LOC-I

- Pilot or human induced
- Environmentally induced
- Systems induced

Bad news: Every time an aircraft takes flight it is exposed to the threat of LOC-I

PILOT OR HUMAN INDUCED FACTORS

- Conflict between Man and Machine (hi-tech)
- Improper rigging of flight controls as a result of stress, ill-training, overdue calibration of instruments
- Indiscipline - Uncoordinated use of airspace (UAV, Military maneuvers, gliders, powered parachutes etc.)
- Malicious interference

PILOT OR HUMAN INDUCED FACTORS cont'd

- Inattention of the crew due to violation of minimum rest crew period,
- Inadequate or improper use of automation by the crew
- Ego of Pilot-in-Command
- Post Traumatic Stress Disorder

ENVIRONMENTALLY AND SYSTEMS INDUCED CASUAL FACTORS OF LOC-1

- Abrupt weather condition changes
- Wind shear
- Systems failure (flight ctrl, engine power)
- Amateur-Built Aircraft

Risk $_{factor}$ = Probability x (Severity + Exposure)

LOC-I THREATS IN GENERAL AVIATION

While airline accidents have become relatively rare in the developed world, pilots and passengers involved in general aviation (GA) operations still die at alarming rates every year due to loss of aircraft control

LOC-I THREATS IN GENERAL AVIATION cont'd

Loss of control – mainly stalls – accounts for the most GA fatal accidents

Between 2001 and 2011, over 40 percent of fixed wing GA fatal accidents occurred because pilots lost control of their airplanes.

LOC-I THREATS IN GENERAL AVIATION cont'd

- GA pilot proficiency requirements are much less rigorous than those of airline pilots.
- GA pilots are much more likely to have longer intervals between training sessions and longer intervals between flights.

LOC-I THREATS IN GENERAL AVIATION cont'd

GA pilots almost exclusively maintain and improve skills on their own, and their conduct of safe flight depends more on individual abilities and judgment, potentially leaving them unprepared for situations that can lead to loss of control.

LOC-I THREATS IN GENERAL AVIATION cont'd

- GA pilots often have less exposure to robust and recurrent training compared to members of full-time charter or corporate flight departments.

LOC-I THREATS IN GENERAL AVIATION cont'd

- Business aviation encompasses a wide range of aircraft types and operational paradigms, which works against any single solution for reducing LOCI incidents.
- Single-pilot and owner-flown aircraft are often lighter and less automated than their business jet counterparts

LOC-I THREATS IN GENERAL AVIATION cont'd

- In addition to facing threats in varying degrees as those of small aircraft, business jet operators also confront high altitude maneuvering, relatively low roll inertia in many business jet designs, and increasing levels of automation complexity rivaling those of modern commercial transports.

LOC-I THREATS IN GENERAL AVIATION cont'd

Many business jet pilots operate more than one type of aircraft, elevating the threats of confusion or negative habit transfer in managing different automation and flight characteristics.

LOC-I THREATS IN GENERAL AVIATION cont'd

- A study of business jet LOCI accidents from 1991 to 2010 noted unintentional stalls occurred in 31 of 71 accidents examined
- Two-thirds of the accidents occurred during takeoff, approach or landing with the aircraft below 1,000 feet AGL, affording those crews precious little recovery margin

LOC-I THREATS IN GENERAL AVIATION cont'd

Twelve of the 31 stall events occurred while banking during a circling approach, implying that this maneuver, performed more frequently in business jets compared to scheduled carrier operations, deserves attention.

Nine of the stall accidents involved degraded aerodynamic efficiency due to in-flight icing and/or inappropriate adjustment to airspeed for such conditions.

LOC-I THREATS IN GENERAL AVIATION cont'd

- Ice-induced binding was also implicated in a number of the flight control anomalies, underscoring that icing and LOCI are frequent associates.
- The following ice-induced conditions are probable causes of LOC-I:

LOC-I THREATS IN GENERAL AVIATION cont'd

- **In-Flight Icing**
- In-Flight Airframe Icing occurs when supercooled water freezes on impact with any part of the external structure of an aircraft during flight.

LOC-I THREATS IN GENERAL AVIATION cont'd

- **Airframe Icing Effects**
- Airframe Icing can lead to reduced performance, loss of lift, altered controllability and ultimately stall and subsequent loss of control of the aircraft. Hazards arising from the presence of ice on an airframe include:

LOC-I THREATS IN GENERAL AVIATION cont'd

- Adverse Aerodynamic Effects
- Blockage of pitot tubes and static vents
- Radio communication problems
- Surface Hazard from Ice Shedding
- The Airframe Ice Accretion Process (rime ice, clear ice, cloudy or mixed ice, super cooled larger droplets – SLD, runback ice)

LOC-I THREATS IN GENERAL AVIATION cont'd

- Inter-cycle ice

Inter-cycle ice is that which forms between cyclic activation of a mechanical or thermal de-ice system.

COMBATING LOC-I: No Silver Bullet Solution

- Unlike technological wonders like TAWS or TCAS, there is no single solution (silver bullet) to the Loss-of-Control In-Flight problem
- FAA's goal is to reduce the GA fatal accident rate by 10 percent over a 10-year period (2009-2018)

COMBATING LOC-I: CONCLUSION

- Exposing pilots periodically to the general nature of the Stall Zone as a worthwhile eye-opener
- ***"Don't remain there, and DEFINITELY avoid ever coming there."***

THANK YOU