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CONTROLLED FLIGHT INTO TERRAIN (CFIT): AN AVIATION SAFETY CHALLENGE ✈

WHAT IS CONTROLLED FLIGHT INTO TERRAIN (CFIT)?

CFIT is an accident where an airworthy aircraft, fully under the control of the pilot or crew, is unintentionally flown into the ground, a mountain, water, or an obstacle.
The crew is typically unaware of the impending collision until it is too late to avert it.

Key Distinction

- CFIT is not a crash resulting from a mechanical failure, loss of control, or pilot suicide.
- The aircraft is operating normally but is simply guided to an unsafe altitude in relation to the terrain.

When Does it Happen?

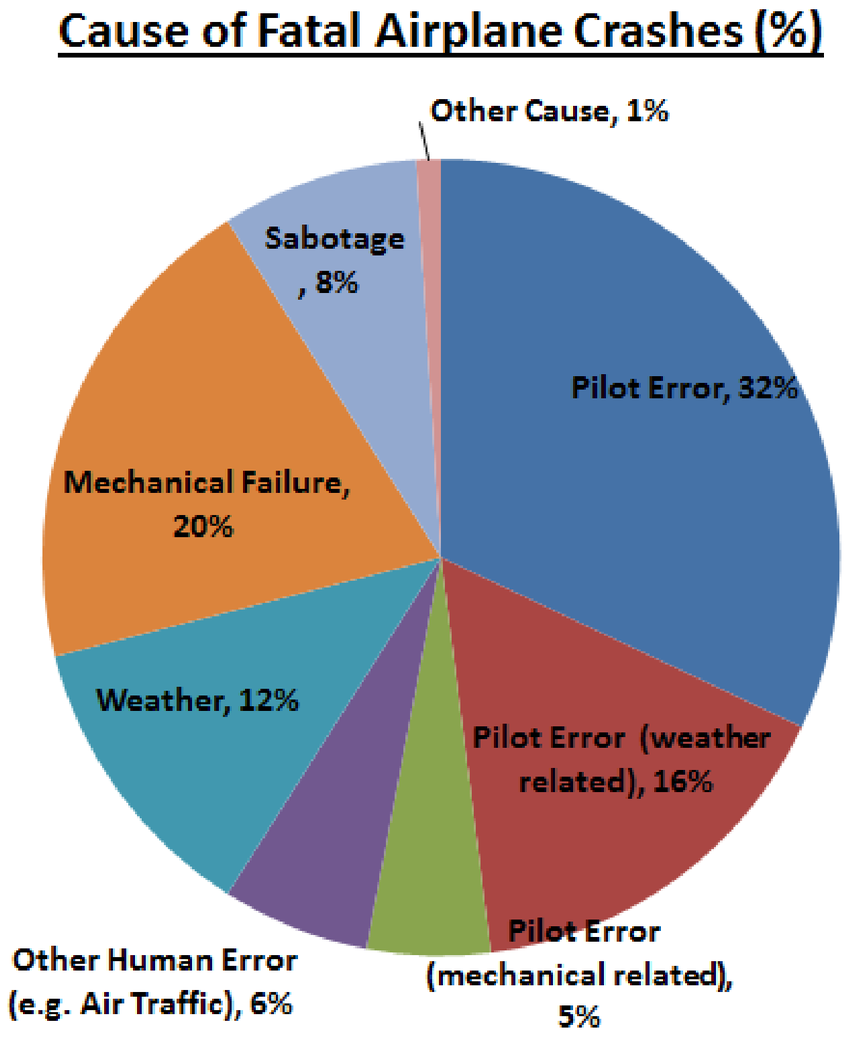
- Historically, CFIT accidents are most common during the approach and landing phases of flight (over 50% of accidents), and to a lesser extent, during the departure/initial climb.

HISTORICAL BACKGROUND ON CFIT: A PERSISTENT KILLER

The problem of CFIT has existed since the beginning of manned flight. The term CFIT was coined by engineers at Boeing in the late 1970s. Before modern safety interventions, CFIT was the single largest cause of fatalities in commercial air travel for decades, leading to over 9,000 deaths since the jet age began.

MAJOR CONTRIBUTING FACTOR: LOSS OF SITUATIONAL AWARENESS

- In the era before advanced warning systems, the root cause was almost always pilot error, stemming from a loss of situational awareness.
- Failure to know the aircraft's position and altitude relative to the terrain.
- Mismanaging complex or non-precision approaches, especially in poor visibility (rain, clouds, or at night).



NOTABLE HISTORICAL CFIT ACCIDENTS

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Date	Incident	Key Factor
1947	BSAA Avro Lancastrian Star Dust	Crew mistakenly began descent over the Andes, believing they had already cleared the mountains.
1975	Royal Air Maroc Boeing 707	Crew flew outside the regular approach corridor in the Atlas Mountains during descent.
1995	American Airlines Flight 965	Crew entered incorrect data into the Flight Management Computer (FMC) and disregarded warnings, causing the aircraft to strike a mountain near Cali, Colombia.
1997	Korean Air Flight 801	Crew failed to adequately execute a non-precision approach in heavy rain and fatigue, crashing short of the runway in Guam.

MEASURES TAKEN: THE TECHNOLOGICAL SOLUTION

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The most dramatic reduction in CFIT accidents came from the development and mandatory adoption of on-board terrain awareness systems.

1. Ground Proximity Warning System (GPWS)

- Introduced in the 1970s as the first mandatory CFIT prevention tool.
- Uses a radio altimeter to warn the pilot when the aircraft is too close to the ground or when the rate of descent is excessive.
- Limitation: It only looks down and behind, offering minimal warning time in steeply rising terrain.

2. Terrain Awareness and Warning System (TAWS) / Enhanced GPWS (EGPWS)

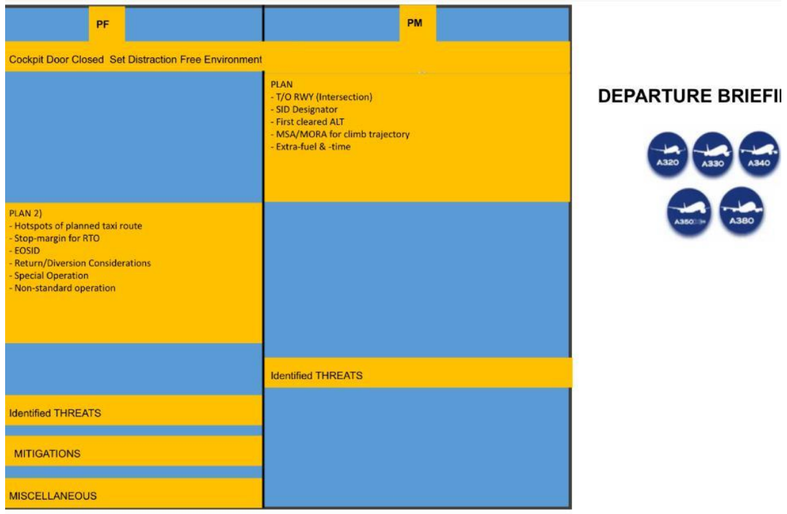
- Mandated in the 2000s, this is the modern standard.
- Combines GPS data with an on-board worldwide digital terrain database to calculate the aircraft's projected flight path relative to terrain ahead.
- Provides a Forward Looking Terrain Avoidance (FLTA) function, giving the crew earlier visual and aural warnings (e.g., "TERRAIN! PULL UP!").
- Result: The widespread deployment of EGPWS/TAWS has successfully reduced the commercial CFIT accident rate to a small fraction of its historical peak.

3. Comprehensive Pilot Training

- CFIT-Focused Simulator Scenarios: Integrating realistic scenarios into recurrent training to practice immediate and correct responses to terrain warnings ("Pull Up" maneuver).
- Pre-Flight Preparation: Mandating thorough study of approach plates, minimum safe altitudes (MSAs), and terrain/obstacle locations, especially in mountainous or unfamiliar areas.

IBOM AIR PERSPECTIVE

- **Offset Recovery and CFIT Awareness Training.**
  - ➢ Offset recovery training is included in all sim cycles.
  - ➢ Using FDM data, Ibom Air has included normal Go-Around procedures in all simulator sessions.
  - ➢ and emphasis on CFIT training during simulator sessions for Pilots during initial type rating and recurrent training.
- **Adopting the Airbus briefing across all Ibom Air fleet .**
- **Threat and Error Management Briefing.**
  - ➢ Discussed for Departures and Arrivals, identifying each threats and discussing mitigations which is performed for all flights especially during marginal weather or high terrain operations.
- **Safety Campaigns**
  - ➢ Distribution of periodic safety bulletins and flyers highlighting the threats associated with CFIT and capturing latest events so crew could learn from them.



CFIT TODAY AND LOOKING FORWARD: CURRENT STATUS

CFIT has been largely eliminated from the top causes of fatal accidents in major commercial air travel due to TAWS and improved procedures.
However, it remains a significant risk in:

- General Aviation (GA) and smaller, unpressurized aircraft.
- Non-scheduled operations (cargo, air ambulance) and helicopter operations (HTAWS/H-EGPWS is a newer focus)

THE NEXT GENERATION OF PREVENTION

Synthetic Vision Systems (SVS)
Displays a highly realistic, computer-generated 3D view of the external world (including terrain and obstacles) on a cockpit screen, regardless of outside visibility. Example is the Global 7500 fleet

Enhanced Flight Vision Systems (EFVS)
Uses infrared and other sensors to project a real-time, enhanced view of the outside world onto a Head-Up Display (HUD), allowing pilots to "see" through certain weather conditions.

CONCLUSION

The fight against CFIT is a continuous process. Combining advanced, forward-looking technology with strict operational discipline remains the foundation for aviation safety.

THANK YOU FOR LISTENING

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