UNSTABLE APPROACHES
AIR TRAFFIC CONTROL CONSIDERATIONS

AIR SAFETY CIRCULAR

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A. PURPOSE:

A1. This Air Safety Circular (ASC) is issued for the purpose of:

A1.1 Identifying factors related to Air Traffic Control actions which may contribute to an unstable approach.

A1.2 Providing Guidance to ANSPs (Air Traffic Controllers) providing Aerodrome, Approach and Area Control Service to avoid unstable approaches.

B. SCOPE:

B1. This Air Safety Circular is applicable to all ANSPs providing Aerodrome, Approach, Area control Service.

C. DESCRIPTION:

C1. BACKGROUND:

C1.1 South Asia Regional Aviation Safety Team (SARAST) has identified that Runway Excursion leads to more runway accidents than all of other causes combined. There are many factors that may cause a runway excursion including runway contamination, adverse weather conditions, mechanical failure, pilot error and unstable approaches. This safety circular will focus only on unstable approaches.

C1.2 **Runway Excursion**
An event in which an aircraft veers off or overrun the runway surface during either takeoff or landing

C1.3 ***Un-stabilized Approach***
An **Un-stabilized approach** is an approach during which an aircraft does not maintain at least one of the following variables **stable: speed**, **descent rate, vertical/lateral flight *path and in landing configuration***, or ***receive a landing clearance at certain altitude etc*** which may results in ***Runway Excursion***,

C2. CURRENT REQUIREMENTS:

C2.1 Modern turbo-jet and turbo-prop aircraft are designed to have highly efficient low drag aerodynamic characteristics. This helps reduce fuel consumption but does result in such aircraft needing longer distances for descent and deceleration. Aircraft in flight, particularly large aircraft, possess a great deal of energy that must be dissipated appropriately during descent, landing and rollout. Aircraft must meet certain criteria on approach to be able to land safely, and managing an aircraft during the descent and approach phases essentially becomes a task of energy management. Landing long or landing at excessive speeds can result in an over-run and excessive sink rates or failure to capture the correct vertical profile can contribute to hard landings or Controlled Flight into Terrain (CFIT). In a de-stabilised approach, the rapidly changing and abnormal condition of the aircraft may lead to loss of control.

C2.2 For each performance criterion, such as speed or rate of descent, aircraft must be within a tolerable 'window' in order for it to be classified as 'stabilised' and continue to land. These criteria are assessed as 'gates' which tend to be established depending on individual airline Standard Operating Procedures (SOPs) and flight conditions. Typically operators require the aircraft to be established on the glide path in the landing configuration at the correct speed at a specified height between 1,500 ft and 1000ft above ground level (AGL).

C2.3 Horizontal speed control instructions have existing provisions for the stabilized approaches, these are found in the chapter 5 Para 5.6 of Manual of Air Traffic Services (MATS) (MNL-001-OPAT-4.0). Further guidance on stabilised approaches are described in MATS as follows:

C2.3.1 Chapter 5 Para 5.7 (Vertical speed Control Instructions);

C2.3.2 Chapter 7 Para 7.5 (Procedures for Arriving Traffic);

C2.3.3 Chapter 9 Para 9.7 (Use of ATS surveillance system in the Air Traffic Control service); and

C2.3.4 Para 9.9 (Use of ATS surveillance system in the Approach Control service).

C3. AIR TRAFFIC CONTROL ACTIONS CONTRIBUTING TO UNSTABILIZED APPROACHES:

C3.1 Inappropriate Air Traffic Control (ATC) actions can contribute to a stable approach becoming unstable due to the following:

C3.1.1 Distance (Time) provision where insufficient track miles are provided for the flight crew to achieve the correct vertical profile and/or aircraft energy during descent;

C3.1.2 Changes of runway can increase flight deck workload and can significantly affect track mileage to touchdown and may not allow sufficient time for the crew to re-plan the approach;

C3.1.3 Changes in the type of approach particularly from precision to non-precision can affect the planned descent profile. Typically, a non-precision approach requires the aircraft to be stabilised in the landing configuration by the final approach fix. It also requires more preparation and planning by the crew;

C3.1.4 Inappropriate vectoring that does not allow the correct descent profile to be flown in relation to the Instrument Landing System (ILS), and vectoring which causes the aircraft to intercept the glide path before the localiser. Most aircraft will not lock into the glide path in this condition, causing the aircraft to 'fly through' the glide path;

C3.1.5 Incorrect track distance to touchdown resulting in flight crew being unable to calculate their descent and speed profile;

C3.1.6 Inappropriate use of speed control which adversely affects the crew's capability to manage the aircraft's energy and its descent profile.

C4. CONTINUOUS DESCENT OPERATIONS (CDO):

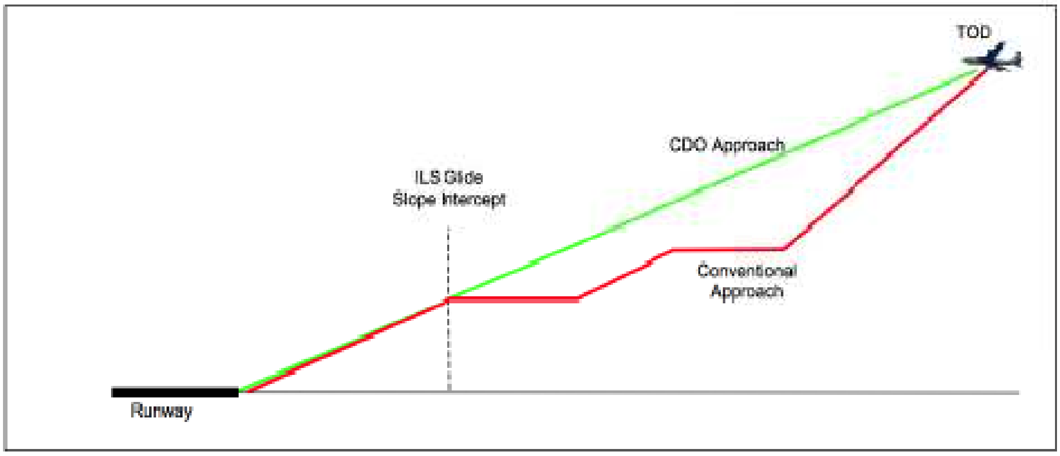
C4.1 In order to reduce chances of Un-stabilized Approach the ATC may refer the guidance material provided in ICAO Document 9931 Continuous Descent Operations (CDO) Manual. In order to ensure effective implementation of CDO techniques following points are highlighted as under;

C4.1.1 The term CDO is used to describe the various methods being used around the world to maximise operational efficiency during arrivals, whilst taking into account any localised issues such as airspace constraints or procedures.

C4.1.2 CDO is a technique available to ANSPs and aircraft operators that helps to increase both safety (through increased flight stability) and airspace capacity (through flight predictability), whilst reducing noise, fuel burn, emissions and pilot-controller communications.

C4.2 An ideal CDO starts from the top of descent (TOD) point in the cruise phase of flight, allowing the aircraft a continuous descent profile, with minimum engine thrust settings, in (where possible) a low drag configuration, with minimum periods of level flight to the final approach fix / point or where it commences the published instrument approach procedure.

A CDO is shown in Figure below:



C4.3 The noise 'footprint' is reduced because the aircraft remains higher for longer and the engines remain at lower thrust (i.e. no need to spool upto level off). Due to the lower thrust settings, the CDO also results in reduced fuel burn and less green house gas emissions.

C4.4 If the aircraft is being vectored, it is essential that the flight crew ***receive timely and accurate distance from touchdown i***nformation from ATC so that they can calculate their required rate of descent. If the aircraft is following a published arrival procedure, the FMS provides an optimum descent path and also deviation information; however, good airmanship calls for the flight crew to still maintain a mental picture of the descent profile.

C4.5 ATC operational requirements for separation and/or traffic sequencing purposes may mean that it is not always possible to provide the optimal CDO, it may be necessary for ATC to stop a descent and direct level flight for portions of the arrival. However, the aim should be to minimise level offs and maximise CDO to the greatest extent possible, whilst not adversely affecting safety and/or capacity ***(ReferDoc-9931 ' Continuous Descent operations').***

C5. TIPS FOR ATCOS TO AVOID UNSTABILIZED APPROACH:

C5.1 ***Avoid unexpected shortcuts.*** The Unexpected shortcuts may lead to insufficient time and distance remaining to maintain the desired descent profile, and cause the aircraft to be high on the approach. Avoid close-in turns to final.

C5.2 ***When aircraft are being vectored, issue track miles to the airport*** or approach fix in a timely manner, as appropriate.

C5.3 ***Keep the pilot informed regarding runway assignment***, type of approach and descent/speed restrictions. That will allow for proper planning and execution of the approach. Stable approaches require predictability and planning. Avoid last minute changes and advise the pilot as early as possible when changes are anticipated.

C5.4 ***Ensure the runway assignment is appropriate for the wind***. Wet or contaminated runways, combined with cross/tail winds are often associated with runway excursions.

C5.5 ***Issue accurate and timely information related to changing weather***, wind and Airport / runway conditions.

C5.6 ***Apply appropriate speed control / restriction***s. Assigning unrealistic speeds (too fast or slow) may lead to unstable approaches.

C5.7 ***Give preference to precision or RNAV (GNSS) approaches*** over non-precision approaches. Precision or RNAV (GNSS) approaches have vertical guidance which assists the pilot in maintaining the proper descent profile, resulting in stable approaches.

C5.8 ***Avoid instructions that combine a descent clearance and a speed reduction***. Many aircraft can't descend and slow down simultaneously.

C5.9 ***Comply with operational flight requirements*** related to capturing the glide slope from below. Vectoring for an approach that places an aircraft on the final approach course above the glide slope is a leading cause of unstable approaches.

C5.10 ***Avoid close-in, last second runway changes, even to a parallel runway***. To comply with the company's operational procedures and requirements, the flight crew must have time to properly brief the approach and missed approach procedure to the runway being utilised. Even though a pilot may accept a runway change, the result may be an unstable approach.

C6. GENERAL CAUSAL FACTORS OF UNSTABLE APPROACHES:

C6.1 The following list suggests general causal factors of unstable approaches. Many of these are unrelated to ATC but rated as ***nice to know;***

C6.1.1 Weather (e.g., turbulence, head/tail/Cross winds, avoidance, un-forecast);

C6.1.2 Aircraft technical issues;

C6.1.3 Late or incorrect crew briefings;

C6.1.4 Pilot mismanagement of aircraft energy (e.g., speed, altitude, power);

C6.1.5 Other traffic (e.g., held high to avoid traffic, sequencing to airport, high traffic density);

C6.1.6 Unclear communication: ATC-ATC, ATC- Pilot, Pilot-ATC;

C6.1.7 Overloading of human (controller/pilot) due to workload;

C6.1.8 RT loading/congestion (held high beyond planned top of descent);

C6.1.9 Airspace constraints not fit for purpose (e.g. airspace size, complexity of procedures);

C6.1.10 Early speed control (e.g., go down/slow down, unrealistic energy management);

C6.1.11 Expectations;

C6.1.12 Little / inaccurate distance from touchdown information.

C7. OTHER RELATED PUBLICATIONS:

C7.1 A number of non-CAA technical documents exist, listed below, that deal with the issue of unstable approaches. ANSP unit training officers are required to assess the applicability and usefulness of their content with regard to local requirements. These documents are good overviews of the subject area; however care should be taken as they may contain differences which are not applicable to PCAA practices and procedures. The following documents shall be reviewed:

C7.1.1 Un-stabilized Approach: Inappropriate ATC Speed Instructions, Euro Control Skybrary.

www.skybrary.aero/index.php/Unstabilised_Approach:_Inappropriate_ATC_Speed_Instructions

C7.1.2 Un-stabilized Approach: Delayed Descent Instructions.

www.skybrary.aero/index.php/Unstabilised_Approach:_Delayed_Descent_Instructions

C7.1.3 Un-stabilized Approach: Landing Distance and Final Approach Speed.

www.skybrary.aero/index.php/Unstabilised_Approach:_Landing_Distance_and_Final_Speed_Calculations

C7.1.4 Contribution of Unstable Approaches to aircraft accidents and incidents.

www.skybrary.aero/index.php/Contribution_of_Unstabilised_Approaches_to_Aircraft_Accidents_and_Incidents

C7.1.5 Stabilized Approach, DGAC (France) Good Practice Guide.

www.skybrary.aero/bookshelf/books/537.pdf

C7.1.6 Stabilized Approach:

http://aviationsafetywiki.org/index.php/Stabilised_Approach

C7.1.7 Stabilized Approach. Flight Safety Foundation ALAR Briefing note 7.1.

www.skybrary.aero/bookshelf/books/864.pdf

C7.1.8 Unstable Approaches ATC Considerations, CANSO.

www.canso.org/safety

C8. COMPLIANCE/ACTION TO BE TAKEN:

C8.1 All ANSPs providing aerodrome and approach control services are required to ensure that their staff are aware of the safety issues linked to unstable approaches particularly those discussed in this safety circular and furthermore, bring to their attention the technical documents on the subject listed in paragraph C7 as well.

D. EVIDENCES (ACRONYMS / RECORDS / REFERENCES):

D1. ACRONYMS:

ACARS	:	AIRCRAFT COMMUNICATION AND REPORTING SYSTEM
ANSP	:	AIR NAVIGATION SERVICE PROVIDER
ASC	:	AIR SAFETY CIRCULAR
ATC	:	AIR TRAFFIC CONTROL
ATCOS	:	AIR TRAFFIC CONTROL OFFICERS
CDO	:	CONTINUOUS DESCENT OPERATION
CFIT	:	CONTROLLED FLIGHT INTO TERRAIN
FMS	:	FLIGHT MANAGEMENT SYSTEM
GNSS	:	GLOBAL NAVIGATION SATELLITE SYSTEM
ICAO	:	INTERNATIONAL CIVIL AVIATION ORGANIZATION
RNAV	:	AREA NAVIGATION
SARAST	:	SOUTH ASIAN REGIONAL AVIATION SAFETY TEAM
TOD	:	TOP OF DESCENT.

D2. RECORDS:

D2.1 Air Safety Circulars **(File No. HQCAA/1111/112/ARAN/I)**

D3. REFERENCES:

D3.1 Guidance Material of Civil Air Navigation Services Organization **(CANSO)**

D3.2 Continuous Descent Operation Manual **(ICAO DOC-9931)**

D3.3 Document & Record Control **(CAAO-001-MSXX)**

D3.4 Security Grading / Classification & Maintenance of Files / Documents **(CAAO-004-HRBS)**

IMPLEMENTATION:

This Air Safety Circular is implemented with immediate effect.

(ASIM SULEIMAN)
Air Marshal (Retd.)
Director General
Pakistan Civil Aviation Authority

Dated: - 31 **December 2016**

(Engr. MUHAMMAD AZHAR SALEEM)
Director Airspace & Aerodrome Regulations

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