الهيئة العامة للطيران المدني
CIVIL AVIATION AUTHORITY
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AGA-OPS Future Challenges for the MID Region

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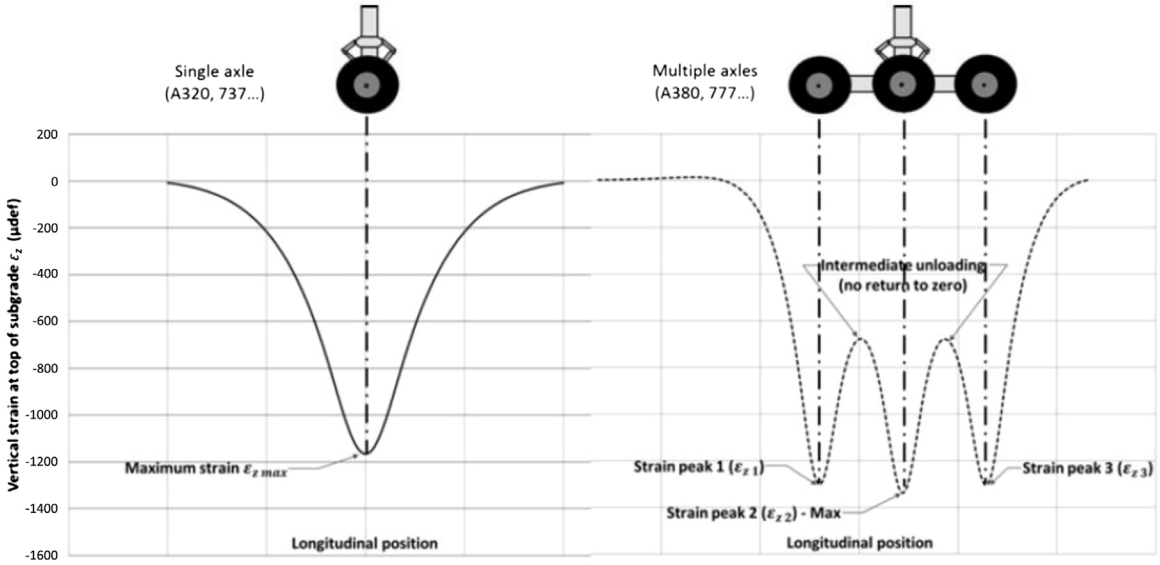
Implementation of ACR-PCR Methodology in ICAO Annex 14



01

Background on ACR-PCR

- ***As part of ICAO's continued modernization of aerodrome infrastructure standards, Amendment 15 to Annex 14, Volume I : Aerodrome Design and Operations introduces the Aircraft Classification Rating - Pavement Classification Rating (ACR-PCR) methodology, replacing the long-standing ACN-PCN system.***
- ***The amendment became effective on 3 November 2022 and been applicable globally as of 28 November 2024.***

02

Rationale behind the change

- ***The old ACN-PCN system was often criticized for being:***
  - ✓***Overly conservative or not suitable for multi-aircraft operations;***
  - ✓***Lacking transparency in calculation;***
  - ✓***Obsolete with respect to new-generation aircraft and mixed fleet operations.***

03

ACR-PCR Main Elements

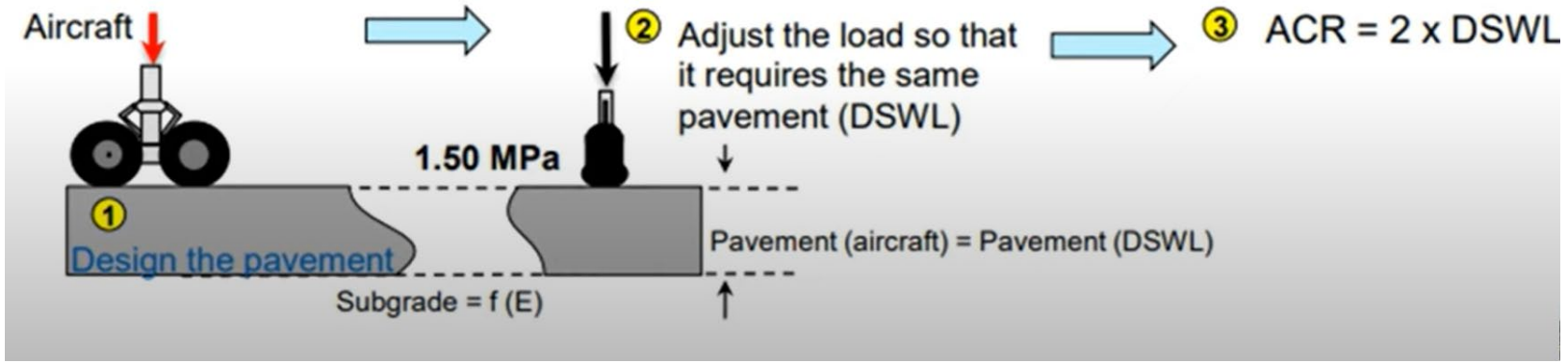
- ***The method introduces two distinct elements:***
  - ✓ ***Aircraft Classification Rating (ACR): Represents the pavement loading effect of an aircraft, computed based on aircraft geometry, mass, and tire pressure, considering standard pavement types and subgrade categories.***
  - ✓ ***Pavement Classification Rating (PCR): Indicates the load-carrying capacity of a pavement, determined via a technical evaluation (T) or derived from aircraft experience (U).***

03

ACR-PCR Main Elements

The Aircraft Classification Rating (ACR):

- ***ACR quantifies how much an aircraft stresses a pavement.***
  - ✓ ***Calculated for each aircraft type, at a given mass and CG (center of gravity),***
  - ✓ ***Based on four standard subgrade strength categories (A to D),***
  - ✓ ***Expressed using a derived single wheel load (DSWL) under a standardized tire pressure of 1.50 MPa.***



03

ACR-PCR
Main Elements

Pavement Classification Rating (PCR):

- ***PCR indicates the strength of a pavement to support aircraft operations without restriction.***
- ***Using a Cumulative Damage Factor (CDF) model that:***
  - ✓ ***Assesses how much of the pavement's life has been "used" by aircraft traffic,***
  - ✓ ***Accounts for lateral wander (distribution of aircraft paths),***
  - ✓ ***Applies Miner's Rule to compute total damage from mixed aircraft traffic.***
- ***PCR is the ACR of the critical aircraft that causes a total CDF = 1.0 over the projected pavement life.***

04

PCR Calculation

Pavement Classification Rating (PCR):

- ***Evaluation Methods***
  - ***Technical Evaluation (T): Mechanistic analysis using LEA + real aircraft traffic data.***
  - ***Using Aircraft Experience (U): Empirical, based on current operational history when technical evaluation is not feasible.***
- ***Reporting Format (as per ICAO Annex 14, Volume I)***
- ***Example: PCR 690 / F / B / W / T***

Rigid or Flexible (F), Subgrade Category (B), Tire Pressure Code (W), Evaluation Method (T)

04

PCR Calculation Challenge

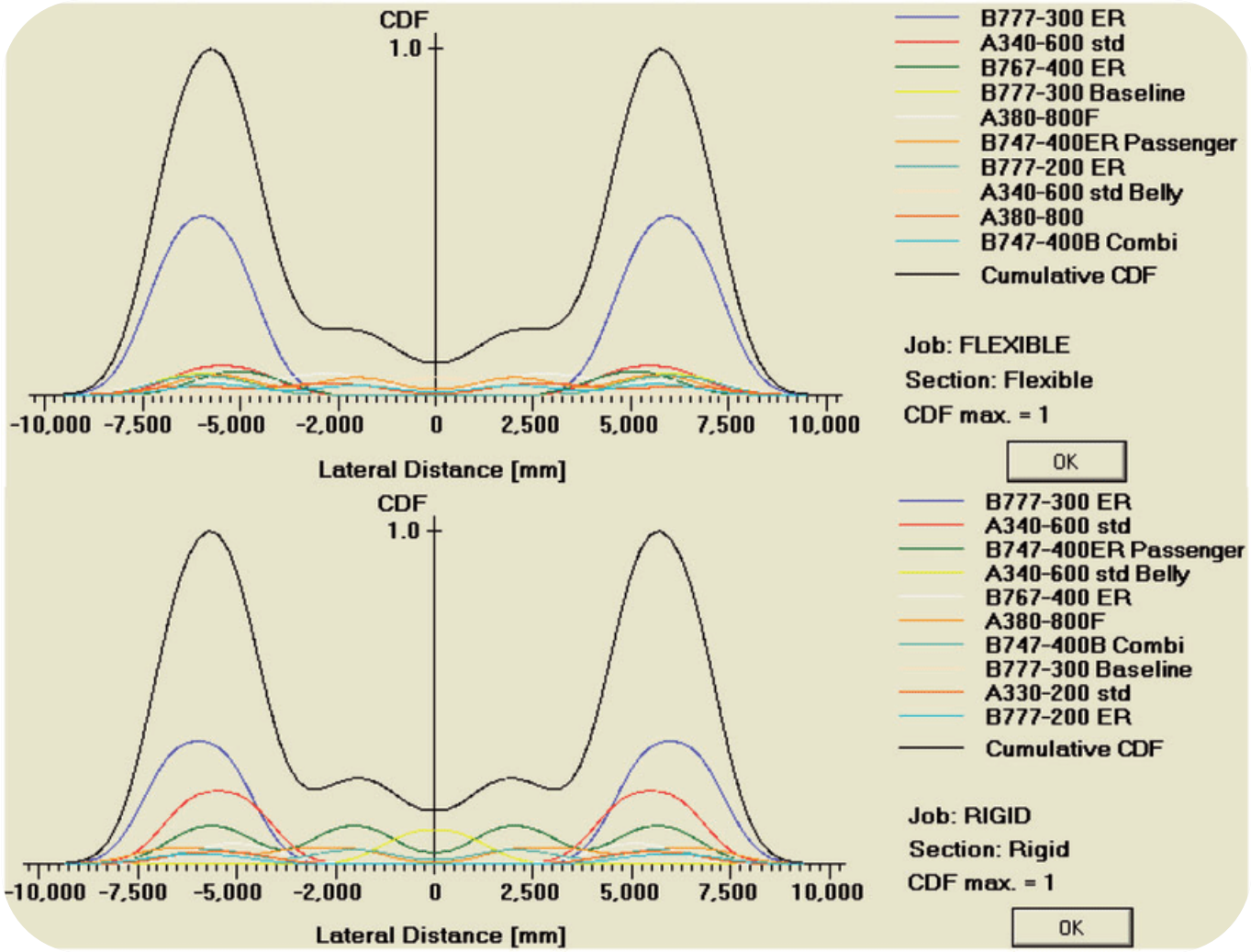
Pavement Classification Rating (PCR):

- ***The PCR iterative method is used when a technical evaluation (T) is performed and aims to identify a critical aircraft whose ACR value will serve as the PCR, ensuring that the cumulative damage factor (CDF) of the actual traffic mix over the pavement's design life equals 1.0.***

- ***The iterative method ensures that the PCR:***
  - ✓ ***Reflects true operational usage, not just the heaviest aircraft,***
  - ✓ ***Avoids overly conservative or unsafe assumptions.***

04

PCR Calculation Challenge



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ACR-PCR:

Effective & Applicability Dates

- ***The ACR-PCR is performance-based and enables better load management, predictive planning, and operational decision-making.***

Item	Date
Effective Date	3 November 2022
Applicability Date	28 November 2024

05

ICAO Support Materials and Tools

- ***Reginal Webinar is planned in coordination the Airport Council International (ACI APAC-MID Office)***
- ***Tentative Date: June 2025***
- ***ICAO GAT In-person-Virtual Training available as requested by the State. Can be also coordinated through the ICAO MID Office.***

Revision of Obstacle Limitation Surfaces (OLS) in Annex 14, Volume I

01

Background on the New OLS

- ***Following the adoption by the ICAO Council on 28 March 2025 (State Letter AN 4/1.1.53-23/59), the provisions of Annex 14, Volume I, Chapter 4, concerning Obstacle Limitation Surfaces (OLS) have been comprehensively revised.***
- ***The new OLS framework introduces two categories of surfaces: Obstacle Free Surfaces (OFS), which must remain free of obstacles, and Obstacle Evaluation Surfaces (OES), where obstacle penetrations may be permitted following an aeronautical study.***
- ***This risk-based, performance-driven approach aligns airspace protection with operational needs, supporting the accommodation of modern aircraft operations, Performance-Based Navigation (PBN) procedures, and evolving urban environments while maintaining or enhancing aviation safety.***

02

Rationale behind the Amendment

- ***The current OLS model dates from the 1950s–1970s, based on the operational needs and aircraft of that time.***
- ***New aircraft types (larger, more capable, PBN-capable) require more specific and operationally aligned protection surfaces.***
- ***Old OLS were not always aligned with instrument procedure design (PANS-OPS surfaces).***
- ***Protection of airspace needs to be balanced with cost, urban development, and real operational needs (instead of over-protection or under-protection).***
- ***The ICAO 12th Air Navigation Conference (Recommendation 6/14) and Assembly Resolution A38-7 formally requested ICAO to review and modernize the OLS.***

03

New OLS System

Feature	Description
Obstacle Free Surfaces (OFS)	Surfaces closely associated with actual flight operations (e.g., take-off, approach paths). Must be **free of obstacles**.
Obstacle Evaluation Surfaces (OES)	Surfaces that allow **controlled penetrations** if assessed by an **Aeronautical Study** and mitigated.
More Tailored Surfaces	Different profiles for **straight-in approaches**, **curved PBN approaches**, **missed approaches**, and **take-off climb-out**.
Operational Risk-Based Approach	Penetrations are assessed through **formal aeronautical studies**, using a risk-based methodology.
New Visual Segment Surface (VSS)	Protects the final segment of non-instrument visual approaches (transition to runway).

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New OLS System : Simplified

- ***OFS must be clear.***
- ***OES can tolerate obstacles if properly assessed and managed.***
  - ➔***This enables flexible, intelligent aerodrome safeguarding while ensuring flight safety.***
  - ➔***Not everything must be removed anymore: Obstacle studies, shielding, and mitigations are allowed where justified.***

04

New OLS System :

VS

Old OLS System

Feature	Old OLS System (Pre-Amendment)	New OLS System (Post-Amendment)
Concept Basis	Fixed geometrical surfaces based on basic flight assumptions (1950s-70s operational concepts).	Operationally driven, performance-based surfaces tailored to real aircraft and modern procedures.
Surface Type	One set of uniformly applied surfaces (Approach, Take-off Climb, Transitional, Inner Horizontal, Conical, Outer Horizontal).	Two categories: **Obstacle Free Surfaces (OFS)** and **Obstacle Evaluation Surfaces (OES)** with different roles and flexibility.
Relation to Flight Paths	Surfaces not always aligned with actual PANS-OPS (flight procedure) designs.	Closely aligned with **instrument procedures** including straight, curved, and segmented approaches (PBN compatible).
Treatment of Obstacles	Limited options: obstacles either to be removed or to be marked.	Risk-based: obstacles penetrating **OES** may be allowed following **aeronautical studies and mitigation**.
Flexibility	Low flexibility: Difficult to adapt to unique aerodrome constraints without exemption processes.	High flexibility: States can adjust and manage obstacles based on tailored operational needs.

04

New OLS System : VS Old OLS System

Feature	Old OLS System (Pre-Amendment)	New OLS System (Post-Amendment)
Flexibility	Low flexibility: Difficult to adapt to unique aerodrome constraints without exemption processes.	High flexibility: States can adjust and manage obstacles based on tailored operational needs.
Surface Dimensions	Based on **Aerodrome Reference Code** only (e.g., Code 3C, 4F).	Based on **Aeroplane Design Group (ADG)** and specific **operational use** of the runway (e.g., CAT II/III ops, PBN ops).
Urban Development Management	Often overly restrictive for cities growing around airports.	Better balance between urban development and safety requirements.
Modernization Need	Surfaces outdated for large aircraft (e.g., Code F like A380) and new navigation methods.	Fully modernized for **next-generation aircraft**, **RPAS (drones)**, and future operations.
Implementation Support	Limited manuals (mainly Doc 9137 Part 6, old edition).	Full support: Updated Doc 9137 Part 6, software tools, training packages, iPacks, ICAO seminars.
Applicability Period	Immediate or within 2-3 years of amendments.	Extended transition until **21 November 2030** to allow progressive adaptation.

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ICAO Support Materials and Tools

- ***New Airport Services Manual, Part 6 (Doc 9137) under revision (5 new chapters, expected mid-2025).***
- ***ICAO OLS Software Tool (to help airports draw new surfaces easily, available in 2025).***
- ***OLS Implementation iPacks (for States that request direct support).***
- ***Global and regional seminars***

06

New OLS System :

Effective & Applicability Dates

- ***New OLS is risk-based, flexible, modern, and aligned with operational reality.***
- ***Helps airports manage urban development without compromising safety.***
- ***Strongly supports PBN, GNSS, and future advanced navigation operations.***

Item	Date
Effective Date	4 August 2025
Applicability Date	21 November 2030

Thank You