IMPLEMENTATION ROADMAP AND CHALLENGES IN MALAYSIA'S TRANSITION FROM ACN-PCN TO ACR-PCR SYSTEM FOR AERODROME PAVEMENT BEARING STRENGTH

IP/14

The Requirements

- The ICAO mandates that the bearing strength of aerodrome pavements must be determined and reported using a **standardized method** outlined in Annex 14 Volume I - Aerodrome Design and Operations. Current reporting pavement bearing strength using **ACN-PCN**, is set to be replaced by **ACR-PCR**.

- This transition is scheduled to take effect by **28 November 2024** .

- Reporting ACR-PCR shall include

  a) Pavement classification rating (PCR) and numerical value;
  b) Pavement type for ACR-PCR determination (R or F);
  c) Subgrade strength category (A,B,C or D);
  d) Maximum allowable tire pressure category or maximum allowable tire pressure value (W,X,Y or Z); and
  e) Evaluation method (U or T).

Examples

631 F/C/W/U	**672 F/C/W/T**

Strategic Approach

The Evaluation method specified in Annex 14 Vol 1:

a. **Technical evaluation (Code:T)** - Representing a specific study of the pavement characteristics and application of pavement behaviour technology.

b. **Using aircraft experience (Code: U)** - Representing a knowledge of the specific type and mass of aircraft satisfactorily being supported under regular use.

In Malaysia, the PCR declaration planning in **two (2) phases** for 22 Airports.

c. **Phase I : Declaration using Aircraft Experience (U)- 2024**
(Facilitated by Subject-Matter Expert and internal committee members utilizing the ICAO ACR ver1.4 software)

d. **Phase II : Declaration using Technical Evaluation (T) - 2024-2028**
(Conducted by external parties, pavement expert to evaluate pavement design and conduct on-site non-destructive test and using Faarfield Software)

Strategic Approach

Step 1	**Establishment of Task Force Team:** A dedicated task force team comprising Subject-Matter Experts in pavement engineering, aerodrome regulatory compliance, and aviation safety was established to collaboratively plan, execute, and ensure effective decision-making throughout the migration process.
Step 2	**Training & Awareness:** Representatives from the task force attended specialized training sessions conducted by ICAO and external parties, ensuring comprehensive understanding and uniform implementation through knowledge dissemination within the team.
Step 3	**Data Collection :** Comprehensive data collection was conducted across all airports to accurately determine pavement strength parameters based on existing Aeronautical Information Publication (AIP).
Step 4	**Engagement with States:** Collaborative sessions were conducted with state authorities to present collected data and seek validation prior to publication. CAA Malaysia under Air Navigation Services and Aerodrome Division played a pivotal role in the joint effort towards the successful migration process.
Step 5	**Workshop for updating of Data in AIP and other documents:** Amendments to the AIP were meticulously planned and executed, ensuring the incorporation of updated data in readiness for official publication.
Step 6	**Identify the Scope, Process and Planning for Technical Evaluation:** The Technical Evaluation scope of works include design assessment of pavement and on-site testing which requires involvement of pavement specialist. Once technical assessment is completed, it will replace the data of pavement strength using aircraft experience.

Roadmap for Declaration of PCR

Kick-off Meeting 1/2023
- Established task force committee.
- Identified scope of program.
- Draft timeline.

15 Nov 2023

Training & Awareness
- Training Virtual Classroom.
- KSS by HLA Consultant.
- ICAO ACR-PCR Workshop.

Dec 2023 - Feb 2024

Assessment of Requirement
- Assessment requirement for each airport.
- Current budget allocation for airport vs requirement.
- Implementation timeline.

19 March-1 Apr 2024

Workshop ACR-PCR (U)
Data gathering for all airports using aircraft experience.

Apr 2024

Workshop AIP Amendment
- AIP Textual
- AIP Charts
- Aerodrome Manual
- CAAM ANSA Review

May- June 2024

Submission to CAAM AIS
AIPA on PCR (U)

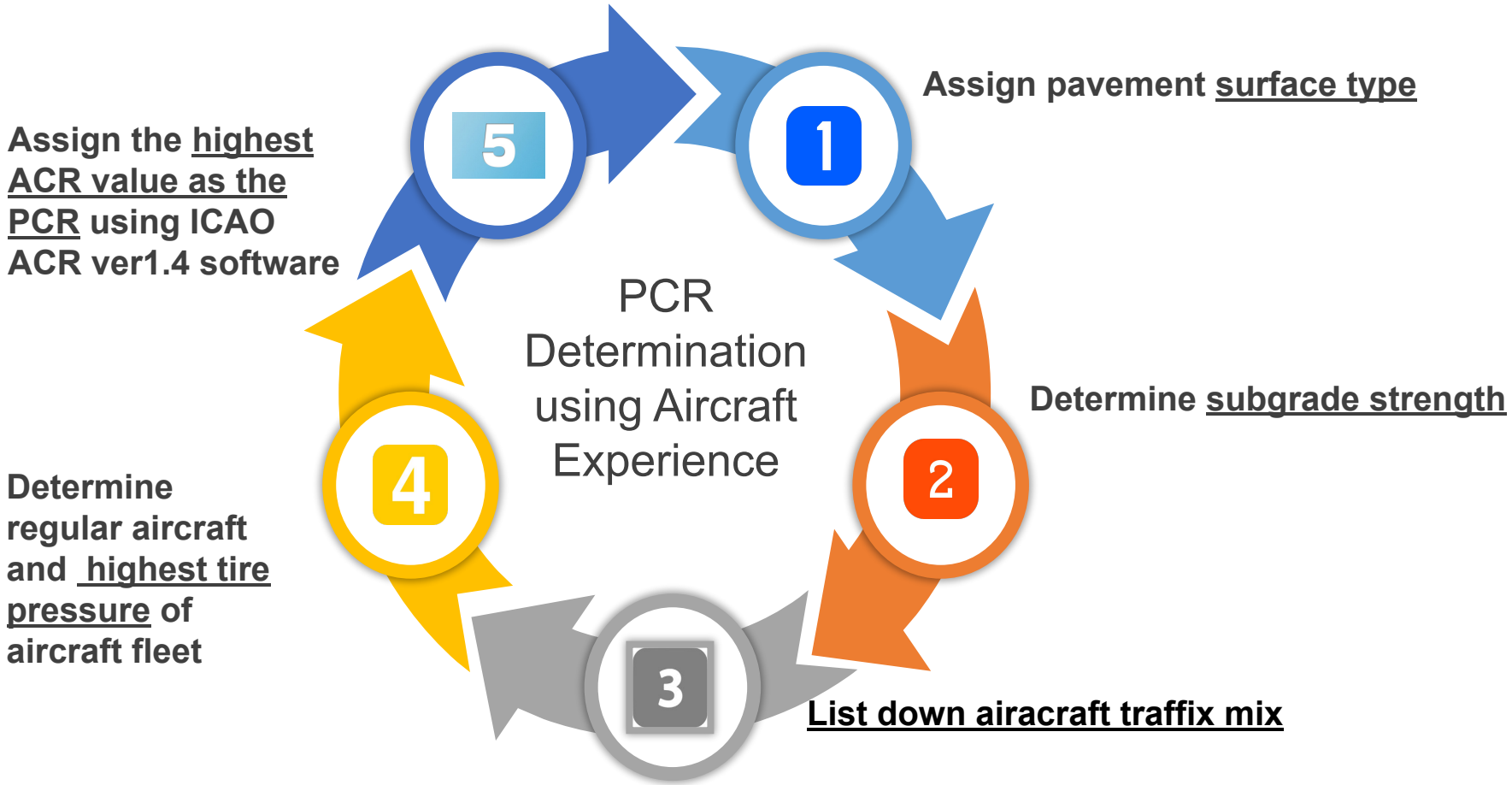
19 Sept 2024

Effective Date for Changes in AIP for PCR (U)

28 Nov 2024

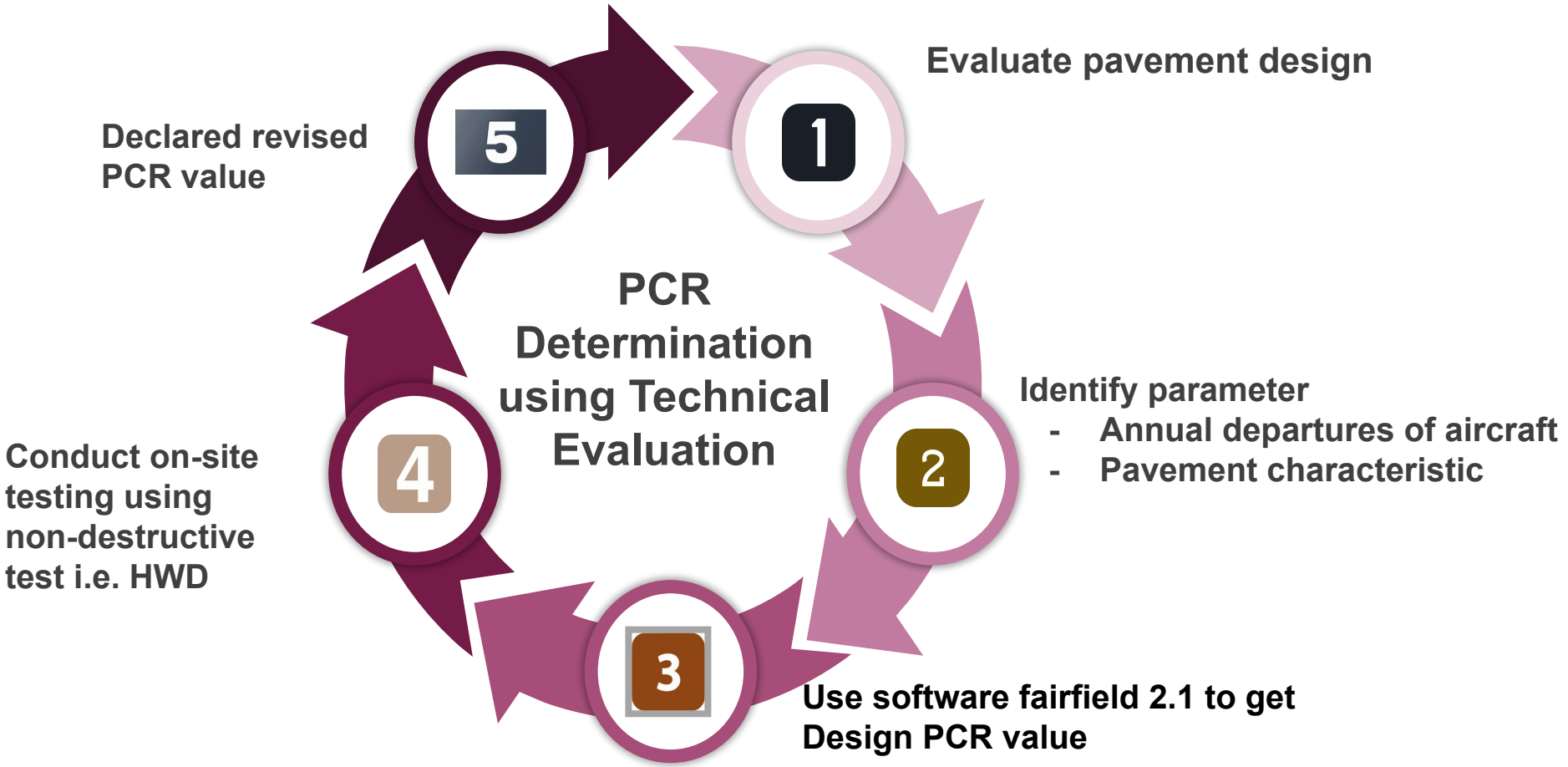
Phase I : Declaration of Pavement Strength Using Aircraft Experience (U)

- Based on current declaration of PCN and type of aircraft operated at the specific runway, taxiway, apron and aircraft stand



Phase II : Declaration of Pavement Strength Using Technical Evaluation (T)

- Based on design and also non-destructive test on site



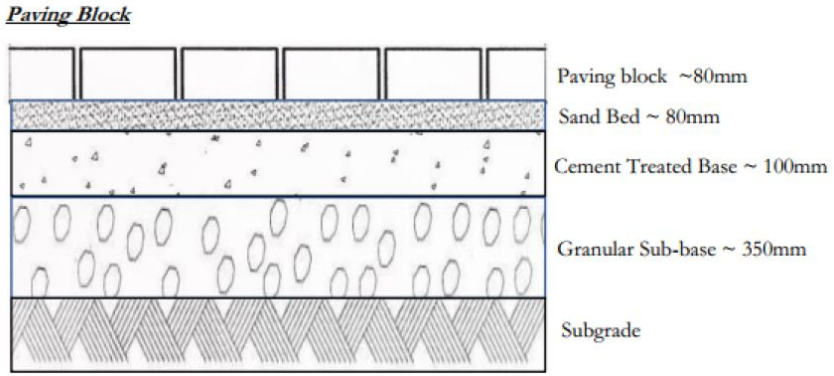
Using Aircraft Experience vs Technical Evaluation

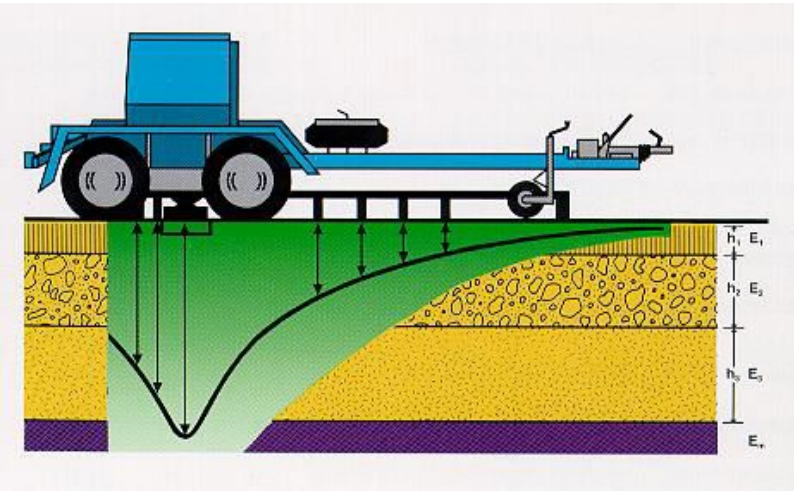
Case Study : Subang Airport Malaysia

Regular Aircraft	Location	Aircraft ACR	Current Pavement Strength (design) PCN	Pavement Strength , PCR (U)	Design Pavement Strength (T) -PCR	Pavement Strength PCR After On-site testing(T)
A321-200	Bay 5	521 F/C	55 F/C/W/T	631 F/C/W/U	672 F/C/W/T	670 F/C/W/T

Non-destructive testing includes: -
I. Heavy Weight Deflectometer (HWD)
II. Coring
III. Dynamic Cone Penetration (DCP)

Data from the **Heavy Weight Deflectometer (HWD)** test was used to compute the elastic modulus values for each pavement type





Challenges

The migration from the ACN-PCN method to the ACR-PCR system in Malaysia involves several challenges.which include:

- Adapting to new calculation methodologies and technical criteria under the ACR-PCR system may require significant **training** and adjustment for aerodrome operators.
- Ensuring for **undergoing airport development project**, declaration of ACR-PCR in place.
- Providing adequate **training** and **capacity building programs** in the migration process to enhance understanding and ensure consistent implementation.
- Ensuring **comprehensive** and **accurate data collection** across all airports to establish ACR-PCR parameters can be resource-intensive and time-consuming.
- **Coordinating the implementation timeline** and activities among various stakeholders, including with various airports personnel, regulatory authorities, and international organization, requires effective communication and collaboration.
- Assessing the **financial impact** especially of upgrading or modifying existing infrastructure and equipment to meet ACR-PCR requirements may present budgetary challenges for states.
- ICAO-ACR and FAARFIELD software have limitations in their data, which exclude certain **types of aircraft** and **helicopters.**
- Limitations exist in the Falling Weight Deflectometer (FWD) machinery supplied by local vendors for technical evaluations.

Action By the Meeting

The meeting is invited to:

a) note the information contained in this paper;

b) encourage member States to collaborate by sharing and exchanging their experiences in implementing the ACR-PCR migration; and

c) discuss any relevant matters as appropriate.

THANK YOU

Reference:

FAA AC 150/5335-5D Appendix B & Example

Google search: ICAO-ACR software,
https://www.airporttech.tc.faa.gov/Products/Airport-Safety-Papers-Publications/Airport-Safety-Detail/ICAO-ACR-14