60th CONFERENCE OF DIRECTORS GENERAL OF CIVIL AVIATION ASIA AND PACIFIC REGIONS

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AGENDA ITEM 3: AVIATION SAFETY

FLIGHT SAFETY FOUNDATION REGIONAL AIRWORTHINESS NEEDS ANALYSIS STUDY

(Presented by the Flight Safety Foundation, Co-sponsored by Singapore and AAPA)

SUMMARY

In January 2024, the Flight Safety Foundation launched a comprehensive Regional Airworthiness Needs Analysis Study to identify underlying issues contributing to system component failures or malfunctions in both non powerplant (SCF-NP) as well as powerplant (SCF-PP) categories. Additionally, the study assessed the effectiveness of the flow of continuing airworthiness information among regulatory authorities, air operators, and maintenance organizations. Given that the issues identified in this study reflect broader global trends, not just those in the APAC region, the Flight Safety Foundation will also be presenting a Working Paper on this topic at the 42nd Session of the ICAO Assembly in 2025. This paper presents a summary of key findings and recommendations of the Airworthiness Needs Analysis Study.

FLIGHT SAFETY FOUNDATION REGIONAL AIRWORTHINESS NEEDS ANALYSIS STUDY

1. INTRODUCTION

1.1 In January 2024, the Flight Safety Foundation, through its Asia Pacific Centre for Aviation Safety (AP-CAS), initiated a comprehensive regional airworthiness needs analysis. This study aimed to identify underlying issues contributing to System Component Failures or Malfunctions — Non-Powerplant (SCF-NP) and System Component Failures or Malfunctions—Powerplant (SCF-PP) in the Asia Pacific region. Additionally, the study assessed the effectiveness of the flow of continuing airworthiness information among regulatory authorities, air operators, and maintenance organizations. The analysis, conclusions, and recommendations will inform and enable aviation stakeholders and FSF AP-CAS to prioritize their regional engagement, including, but not limited to, outreach, technical assistance, and training activities.

1.2 The study focused on identifying the underlying factors associated with the high number of SCF-NP and PP (when combined together) in the Asia Pacific Region as reported by State accident investigation authorities. Data concerning the nature of failures, as identified during the AP-CAS Regional Safety Assessment, was further supplemented by engaging with a cross section of airlines, MRO's as well as regulators from various States of Design. A survey was conducted with the support of AAPA, which facilitated participation by reaching out to both member and non-member airlines to ensure broader industry representation to enhance this analysis. The outcomes of our analysis for SCF-NP, SCF-PP, and the flow of continuing airworthiness information were shared with AAPA, IATA, FAA, EASA, and ICCAIA for their feedback, review and insights. Report highlights of the Airworthiness Needs Analysis Study were also published on the FSF-APCAS Web site.

1.3 The 14th Regional Aviation Safety Group Meeting (RASG/14, December 2024, Bangkok, Thailand) encouraged States and industry to continue supporting the Flight Safety Foundation Asia Pacific Centre for Aviation Safety (AP-CAS) in its ongoing efforts in Study. The Meeting also requested that FSF report the progress of its study to the next Asia Pacific Regional Aviation Team Meeting and the results to the next Directors General of Civil Aviation Conference. The Meeting also encouraged States and ICAO to refer to the FSF AP-CAS Airworthiness Needs Analysis Study when finalized. The study further identified broader concerns in regulatory oversight and global airworthiness information sharing, reinforcing the need for coordinated international action.

2. DISCUSSION

2.1 The APAC Airworthiness Needs Analysis study identified that SCF-NP events accounted for a significant proportion of non-fatal accidents and serious incidents, with cabin pressure system failures, hydraulic and landing gear failures, and electrical failures being the most common issues. Similarly, SCF-PP events predominantly involved turbine blade failures and other critical powerplant component failures. When combining occurrences categorized as system/component failure or malfunction—non-powerplant (SCF-NP) and powerplant (SCF-PP)—they comprised the greatest number of non-fatal accidents and serious incidents in the APAC region during the analysis period (2017 to 2023), accounting for approximately one-fourth of all occurrences.

2.2 Fifty six percent of APAC States have low Effective Implementation (EI) scores in key airworthiness oversight areas, including technical personnel qualifications, certification and approvals, surveillance obligations, and resolution of safety concerns.

2.3 The study identified some of the underlying factors that may contribute to shortcomings that may lead to recurring system component failures or malfunctions such as weaknesses in aircraft

maintenance programs; handling of recurring defects; defect rectification and control; and minimum equipment list (MEL) approval processes. These issues require careful review and continuous improvement by regulators, air operators, and approved maintenance organizations (AMOs).

2.4 A key finding of the study was the widespread absence of robust root cause analysis in investigation reports involving system component failures. Many serious incident investigations lacked sufficient analysis of underlying causal factors, limiting the ability to identify meaningful preventive actions and reducing the overall effectiveness of safety interventions. This underscores the need for greater emphasis on structured and comprehensive root cause analysis in serious incident investigations.

2.5 Additionally, the study highlighted persistent challenges in the application of Service Difficulty Reporting (SDR) and fault defect reporting—issues that are not unique to the region but observed globally. A recurring concern was the inconsistent integration of root cause analysis within reporting frameworks, which diminishes the ability to understand contributing factors and mitigate future operational risks. Closely linked to this issue is the need for a more structured application of safety investigation techniques within both the Safety Management Systems (SMS) of air operators and, where implemented the SMS of Approved Maintenance Organizations (AMOs), as well as the State Safety Programme (SSP) frameworks of regulatory authorities. These investigations should aim to establish both causal and contributing factors, thereby strengthening organizational learning, supporting proactive risk management, and enabling States to better identify systemic safety trends

2.6 When analysing how airworthiness related events were reported to a regulatory authority as States of Registry as well as to the State of Design and original equipment manufacturers (OEM), the study found substantial gaps in the use of the ICAO Online Airworthiness Information Network (AIN, formerly ICAO Circular 95). The AIN was developed by ICAO as a web-based tool to facilitate the sharing of mandatory continuing airworthiness information between States, supporting obligations under Annex 8. It was intended to provide a standardized, accessible platform to ensure that critical contact and procedural information related to continuing airworthiness remains current and available to all Member States. Analysis indicated substantial underutilization, with only 12% of APAC regulators consistently updating their airworthiness information since the platform's launch in 2014. Outdated or missing contact details further hindered communication and coordination among States, impeding timely management of continuing airworthiness matters.

2.7 While the Airworthiness Needs Analysis initially focused on the APAC, its findings revealed that the challenges observed are not unique and reflect similar global trends. Global accident and serious incident data align with the APAC findings, confirming that SCF-NP and SCF-PP are among the most significant risk occurrence categories (non-fatal) worldwide. This demonstrates that the associated safety concerns are not confined to the Asia Pacific but form part of a broader global pattern. A subsequent review of global data using the Foundation’s Aviation Safety Network confirmed that SCF-NP and SCF-PP, when combined, also represent the top risk occurrence category worldwide in absolute numbers. Non-fatal accidents are often survivable events, provided pilots take appropriate actions, underscoring the critical role of training and operational preparedness. Notably, the increase in SCF-NP occurrences globally over the past five years has been acknowledged through its proposed inclusion as one of the targets in Goal 1 of the draft Global Aviation Safety Plan (GASP 2026–2028), which will be submitted to the 42nd ICAO General Assembly in the Fall of 2025 for approval.

2.8 The recognition of SCF-NP as an emerging safety priority in the draft ICAO Global Aviation Safety Plan (GASP) 2026-2028 is a positive step forward. If endorsed at the 42nd ICAO General Assembly, this will cement SCF-NP as a global risk category of occurrence, requiring focused safety enhancement initiatives and consideration by Regional Aviation Safety Groups (RASGs) as well as states for their National Aviation Safety Plans (NASPs). However, considering the information provided in this paper and based on the study performed by FSF, RASG-APAC as well as APAC States should also consider integrating SCF-PP into their plans, considering the occurrence category is considered high for the region or for their State.

2.9 Given that the issues identified in this study reflect broader global trends, not just those in the APAC region, the Flight Safety Foundation will be presenting a Working Paper on this topic at

the 42nd Session of the ICAO Assembly in 2025. The paper will highlight the findings of this study and propose measures to strengthen global airworthiness oversight, improve regulatory communication, and enhance the flow of continuing airworthiness information and advance the use of root cause analysis across within both SMS and SSP frameworks.

3. CONCLUSIONS

3.1 SCF-NP and SCF-PP – have emerged as leading global safety concerns, accounting for the highest number of non-fatal accidents and serious incidents in recent years. The findings from the APAC region, validated through global data, underscore persistent weaknesses in oversight, defect reporting practices, and the flow of continuing airworthiness information.

3.2 Deficiencies in root cause analysis, underutilization of the AIN, and low USOAP implementation scores in critical airworthiness oversight areas require urgent attention. Strengthening regulatory capacity, improving operator and AMO reporting practices, and enhancing the usability of global airworthiness information systems are essential steps to address these risks effectively.

4. ACTION BY THE CONFERENCE

4.1 The Conference is invited to:

a) Encourage States and RASG-APAC to include both SCF-NP and SCF-PP in their RASPs and NASPs, particularly where these categories represent elevated risk;

b) Encourage States to review their oversight functions related to maintenance programme approvals, MEL oversight, recurring defect analysis, and SDR systems in alignment with ICAO Annexes 6, 8, and 19;

c) Request ICAO to support States in strengthening root cause analysis capabilities through guidance, training, and the integration of investigation techniques within both SMS and SSP frameworks;

d) Encourage ICAO to update and modernize the Online Airworthiness Information Network (AIN), improve usability, and promote its routine use by all Contracting States for maintaining up-to-date continuing airworthiness contact information and procedures; and

e) Encourage APAC States to support the Working Paper that the Flight Safety Foundation intends to present at the 42nd ICAO Assembly, which proposes actions to strengthen airworthiness oversight, improve regulatory communication, enhance the flow of continuing airworthiness information, and advance the use of root cause analysis across within both SMS and SSP frameworks.

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