SE 172

CAST Safety Enhancement (SE)

Gap Analysis of Existing Airplane Maintenance Process and Follow-on Action Plan

Study Topic
RR–MX
Remaining Risk – Maintenance

CICTT Risk Areas
SCF–NP, SCF–PP

Section I: SE Overview

Study Topic Overview Summary	CAST chartered the Remaining Risk (RR) Joint Safety Analysis Team (JSAT) and Joint Safety Implementation Team (JSIT) in 2003 to study and mitigate the largest aviation fatality risks outside of what CAST had studied between 1997 and 2002. The RR JSAT/JSIT identified several risk areas and mitigations related to aircraft maintenance. The purpose of this SE is to identify and correct gaps within and between the maintenance processes relating to Maintenance Steering Group (MSG) analyses, including the feeders to the analyses [Part 25.1309 analysis, System Safety Analysis (SSA), associated Maintenance Significant Items (MSI), and Structural Significant Items (SSI)], and the Maintenance Review Board Report (MRBR) output from these analyses, that may otherwise preclude the design level system reliability from being maintained throughout the life cycle of the aircraft. The scope of this project should ensure that these processes properly account for complex systems and critical (hazardous, catastrophic, warning system, emergency equipment) failure modes. The project's outputs should ensure (as a minimum) that an air carrier's FAA-approved maintenance program retains the appropriate maintenance task classification (such as safety/hidden safety) and maintenance intervals, for maintenance tasks that limit the exposure to these failure modes, to that intended by the original equipment manufacturer (OEM) or certified by the FAA.
SE Objective	The purpose of this SE is to identify and correct gaps within and between the maintenance processes that could otherwise inhibit the intended design level of safety from being sustained throughout the aircraft life.
Primary Risks Mitigated	System/Component Failure or Malfunction (Non-Powerplant) (SCF–NP), System/Component Failure or Malfunction (Powerplant) (SCF–PP)

Action	Organization(s)	Strategy	Description	Due Date
Action 1	FAA AFS–300	Research	Convene a task force to perform a gap analysis between the certified level of design system reliability and maintaining this reliability with current maintenance and oversight practices and processes. Report findings.	08/31/2011
	Comments: CAST closed this action based on the work group's final report, which identified nine gaps.			
Action 2	FAA AFS–300	Guidance, Policy	Implement mitigations to close gaps as identified in "Scoping Study - Gap Analysis of Existing Airplane Maintenance Processes."	12/31/2016
	Comments: CAST closed this action based on revisions to FAA Advisory Circulars (AC) 25–19, 121–22, and 120–16; and FAA Order 8900.1.			

See section II of this SE for detailed action descriptions.

References: The detailed analysis in the RR JSAT/JSIT Final Report is available through CAST.

SE 172

CAST Safety Enhancement (SE)

GAP ANALYSIS OF EXISTING AIRPLANE MAINTENANCE PROCESS AND FOLLOW-ON ACTION PLAN

STUDY TOPIC
RR–MX
REMAINING RISK – MAINTENANCE

CICTT RISK AREAS
SCF–NP, SCF–PP

TABLE OF CONTENTS

TABLE OF CONTENTS

SECTION II: DETAILED ACTION INFORMATION

Action 1: Perform gap analysis on design system reliability and current practices and processes

Primary Implementer	**FAA Flight Standards Service, Aircraft Maintenance Division (AFS–300)**
Action Objective	FAA AFS–300 should convene a task force to perform a gap analysis between the certified level of design system reliability and maintaining this reliability with current maintenance and oversight practices and processes, and report findings.
Action Timeline	Flow Time: 24 months Due Date: 08/31/2011
Timeline/Flow for Future Adopters	N/A
CAST Lead	FAA AFS

#	Organization(s)	Detailed Steps
1a	FAA AFS–300	Convene a task force to perform a gap analysis between the certified level of design system reliability and maintaining this reliability with current maintenance and oversight practices and processes. This review should include, but not be limited to, the processes and relationships of the planned Key Safety Information (KSI) process, the Maintenance Review Board (MRB)/Maintenance Steering Group 3 (MSG3) process (including intervals and classification), air carrier maintenance programs, original equipment manufacturer (OEM) Airplane Maintenance Manuals (AMM), Certification Maintenance Requirements (CMR), and Principal Maintenance Inspectors (PMI), Aviation Evaluation Groups (AEG), Aircraft Certification Offices (ACO), and OEM oversight. The scope of this review will cover all transport category aircraft regardless of whether the aircraft has an MRB report. This analysis should include maintenance from simple single components to more complex systems, up to and including those systems covered by CMR.
	Complete.	
1b	FAA AFS–300	Report findings.
	Work group final report presented to CAST in April 2011. Nine gaps identified (as listed in Action 2 below).	

Notes	Resources: Working group similar to existing Key Safety Information (KSI) team.

SECTION II

Note: See section III for detailed costs and resources.

SECTION II: DETAILED ACTION INFORMATION

Action 2: Perform gap analysis of design system reliability under current practices and processes

Primary Implementer	**FAA Flight Standards Service, Aircraft Maintenance Division (AFS–300)**
Action Objective	FAA AFS–300 should work with the FAA Aircraft Certification Service (AIR) and International Air Transport Association (IATA) to implement mitigations to close gaps as identified in "Scoping Study - Gap Analysis of Existing Airplane Maintenance Processes."
Action Timeline	Flow Time: 64 months (upon completion of Action 1) Due Date: 12/31/2016
Timeline/Flow for Future Adopters	N/A
CAST Lead	FAA AFS–300

#	Organization(s)	Detailed Steps
2a	FAA AFS–300, FAA AIR, IATA	Coordinate with current rulemaking and guidance material update schedules to implement mitigations to close gaps as identified in "Scoping Study - Gap Analysis of Existing Airplane Maintenance Processes."
	Complete based on revisions to FAA Advisory Circulars (AC) 25–19, 121–22; and 120–16; FAA Order 8900.1. Specific references listed under each gap in the notes below.	
2b	FAA AIR, IATA	Notify AFS–300 when mitigations have been published.
	Complete.	

Notes

"Scoping Study - Gap Analysis of Existing Airplane Maintenance Processes" identified the following gaps:

- GAP 001: Revise FAA ANM–117 Advisory Circular (AC) 25–19, paragraph 9.B.1, Candidate Certification Maintenance Requirements (CMR): The use of "may" is vague and should be more definite or provide guidelines.
  [Revisions contained in AC 25–19A paragraph 10.a]
- GAP 002: Revise FAA AFS–300 AC 121–22A: The AC should have program guidance on controls for the deletion and/or escalation of Failure Effect Category (FEC) 5 and 8 Safety Tasks.
  [Revisions contained in FAA Order 8900.1 Volume 3 Chapter 37 Section 1 Paragraph 3–3708C; AC 120–17B Paragraph 5.2.9 and Appendix B; and AC 121–22C Paragraph 6–3.n.(7)]
- GAP 003: Revise FAA ANM–117 AC 25–19: AC 25–19 and European Union Aviation Safety Agency (EASA) Acceptable Means of Compliance (AMC) 25–19 are not consistent with regards to CMR selection with respect to credit that can be taken for existing Maintenance Review Board (MRB) tasks.
  [Revisions contained in AC 25–19A Paragraph 12(b)(4) and AC 121–22C Chapter 5 Section 2 Paragraph 6(a)]
- GAP 006: FAA ANM–117 AC 25–19: This document gives the operator the impression that the MRB report contains all CMRs. This is no longer correct and is thus misleading.
  [Revisions contained in AC 25–19A Paragraph 13(a)]

Note: See section III for detailed costs and resources.

- GAP 008: FAA AFS–300 FAA Order 8900.1: The absence of standing requirements for carriers to address MRB Report and Airworthiness Limitations Section (ALS) revisions after delivery of their aircraft may result in either overly burdensome mandatory action (AD) or, in the case of the MRB Report, risk that the carrier may fail to introduce a new/revised task that has been determined as necessary to support the continued airworthiness of the aircraft.
  [Revisions contained in FAA Order 8900.1 Volume 3, Chapter 43, Section 1, Paragraph 3–3886 D(5)(c) and Volume 10, Chapter 6, Section 3 (later updated to Volume 10, Chapter 9, Table 10–9–1B item 8, Table 10–8-1C item 2, and Table 10–9–1D items 1 and 2)]
- GAP 009: FAA, Title 14 of the Code of Federal Regulations (14 CFR) part 25, appendix H25.4: CMRs are critical to safety and should have similar treatments as Airworthiness Limitations (AL).
  [Revised 14 CFR Part 25, Appendix H25.4]
- GAP 014: FAA AFS–300 Order 8900.1 Volume 6, Chapter 2, Section 28, paragraph 6–785: D. 2) is out of date. It should be expanded to include ALS, CMR, Supplemental Structural Inspection Documents (SSID), Electrical Wiring Interconnection System (EWIS), and anything else that may be considered a "time limitation." This section would also be an appropriate place to ensure CMRs are appropriately identified as a limitation and cannot be deleted or escalated without Aircraft Certification Office (ACO) approval. Also, add a statement that Maintenance Review Board Report (MRBR) tasks with safety FEC 5 and 8 cannot be deleted or escalated without MRB Chairman and/or OEM/Type Certificate Holder (TCH) approval.
  [Revisions contained in FAA Order 8900.1 Volume 3, Chapter 64, Section 1, Paragraph 3–5065; Volume 6, Chapter 11, Section 24; Volume 3, Chapter 43, Section 1, Paragraph 3–3873 B(3)(f); and AC 120–16C paragraph 6–3(a)]
- GAP 016: FAA AFS–300 AC 120–16, chapter 6, paragraph 603, Standards for Determining Maintenance Time Limitations, infers that the process for determining a maintenance schedule is through the MSG–3 process. MSG–3 is only a piece of the maintenance schedule pie. This section should be expanded to include ALS, CMRs, SSIDs, EWIS, and anything else that may be considered a required task with the maintenance schedule.
  [Revisions contained in AC 120–16G, Chapter 6, Paragraph 6–3(a)(1), 6–4(b), (d), and (e)]
- GAP 019: FAA AFS–300 AC 121–22: The increasing number of rules that require repetitive maintenance tasks, together with the disparate oversight and control by different sections within the regulatory community, has created an overly complex situation that increases risk of mismanagement of task requirements at the carrier level.
  [WITHDRAWN 10/06/2016. Work is currently being done at the IATA level to harmonize the IATA Scheduled Maintenance Data Standard (SMDS) and the S1000D International Specification for Technical Publications.]

Note: See section III for detailed costs and resources.

SECTION III: SUPPLEMENTAL INFORMATION

Source Study	Remaining Risk Joint Safety Analysis Team (JSAT) & Joint Safety Implementation Team (JSIT) Results and Analysis
Related Initiatives	

Total Cost

Action 1	12 people x 5-day meeting per month x 12 months, for ~ 3 man-years.
Action 2	Financial resources should be included in current document revision cycles.

	Organization	Resources Needed
Direct Resource Overview – Government	N/A	N/A

	Organization	Resources Needed
Direct Resource Overview – Industry	N/A	N/A

Indirect Resource Overview

The organizations identified in this section are not expected to incur direct costs associated with implementing this SE, but they may incur indirect costs within their normal line of work.

Organization	Description
N/A	N/A

SECTION III

SECTION IV: REVISION LOG

Major revisions (whole numbers) represent CAST-approved changes to SE language. Minor revisions (decimals) represent minor changes to target dates or completion notes that do not affect implementer actions.

Revision	Date	Description
3.0	10/06/2022	New SE format. Content reorganized and terminology updated. No substantive changes.
2.2	10/06/2016	Action 2 closed (Gap 19 withdrawn).
2.1	12/03/2015	Action 2 due date extended from 12/31/2015 to 12/31/2016 to monitor industry support for the Scheduled Maintenance Data System (SMDS) standard. Only Gap 19 remains open.
2.0	12/05/2013	New SE format. Content reorganized; Actions 3 and 4 deleted. Action 1 closed. Action 2 due date extended from 12/31/2014 to 12/31/2015.
1.0	10/03/2007	Action 1 flow time extended from 18 to 24 months. Action 2 flow time extended from 24 to 48 months.
Original	12/07/2006	CAST adopted SE 172.