SE 232 CAST Safety Enhancement (SE)
GROUND-BASED TECHNOLOGIES

STUDY TOPIC
ALM
APPROACH AND LANDING MISALIGNMENT

CICTT RISK AREAS
GCOL, RI

SECTION I

SECTION I: SE OVERVIEW

Study Topic Overview Summary	Throughout the National Airspace System (NAS), the risk for approach and landing misalignment (ALM) has been identified. This risk includes aircraft approaching or landing on a surface other than what they were cleared for. These other surfaces include the wrong runway, taxiway, or airport. While these events have typically been caught soon enough to prevent an adverse outcome, there have been high-profile events, including an event involving an approach to a taxiway on July 7, 2017, in San Francisco, California. This ultimately led CAST to charter the ALM Joint Safety Analysis and Implementation Team (JSAIT) to analyze misalignments and determine mitigations based on Aviation Safety Information Analysis and Sharing (ASIAS) data from sources such as Aviation Safety Action Program (ASAP) reports, Air Traffic Safety Action Program (ATSAP) reports, and Mandatory Occurrence Reports (MOR). CAST adopted four SEs as a result of the study, two of which are directed toward aircraft operators and original equipment manufacturers (OEM), while the remaining two are directed toward air traffic control (ATC). CAST also adopted one research and development (R&D) SE, which is directed toward aircraft operators and OEMs.
SE Objective	CAST recommends implementing and developing technology that informs an air traffic controller of a potential ALM.
Primary Risks Mitigated	Ground Collision (GCOL) and Runway Incursion (RI)

Action	Organization(s)	Strategy	Description	Due Date
Action 1	FAA ATO	Equipment	Establish a comprehensive list of existing and developing technologies for prevention of misalignments.	8/31/2022
	Comments: CAST closed this action based on current and planned implementation at all Airport Surface Detection Equipment, Model X (ASDE–X)- and Airport Surface Surveillance Capability (ASSC)-equipped airports.			
Action 2	FAA ATO	Equipment	Establish a periodic review of ALM data to prioritize air traffic facilities that would benefit from technology that would mitigate ALM risk.	5/31/2023
	Comments: CAST closed this action based on current and planned implementation at all Airport Surface Detection Equipment, Model X (ASDE–X)- and Airport Surface Surveillance Capability (ASSC)-equipped airports.			
	See section II of this SE for detailed action descriptions.			

References: The detailed analysis in the ALM JSAIT Final Report is available through CAST.

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SECTION II: DETAILED ACTION INFORMATION

Action 1: Establish a comprehensive list of existing and developing technologies for prevention of misalignments

Primary Implementer	**FAA Air Traffic Organization (ATO)**
Action Objective	Establish a comprehensive list of existing and developing technologies that inform an air traffic controller of a potential approach and landing misalignment (ALM).
Action Timeline	Flow Time: 9 months o 1a—3 months o 1b—6 months Due Date: 8/31/2022 o 1a—2/28/2022 o 1b—8/31/2022
Timeline/Flow for Future Adopters	N/A
CAST Lead	FAA Safety and Technical Training (AJI), National Air Traffic Controllers Association (NATCA)

#	Organization(s)	Detailed Steps
1a	FAA AJI, NATCA, FAA Technology Development and Prototyping Division (ANG–C5), FAA Program Management Organization (PMO)	Provide a collaborative approach to identify available technology that would inform an air traffic controller of a potential ALM. Work with internal and external stakeholders to evaluate technologies that mitigate misalignments.
	Complete.	
1b	FAA AJI, NATCA	Formulate the working group to identify the existing and developing technologies. Generate the list of developing technologies. Research the list of existing technologies and their levels of use.
	Complete.	
1c	FAA AJI, NATCA	Update the comprehensive list periodically or as directed by CAST.
	Complete.	

Notes

Note: See section III for detailed costs and resources.

SECTION II: DETAILED ACTION INFORMATION

Action 2: Establish a periodic review of ALM data to prioritize air traffic facilities that would benefit from technology that would mitigate ALM risk

Primary Implementer	**FAA Air Traffic Organization (ATO)**
Action Objective	Establish a periodic review of approach and landing misalignment (ALM) data to identify air traffic facilities that would benefit from technology that would mitigate ALM risk.
Action Timeline	Flow Time: 18 months o 2a—3 months o 2b—3 months o 2c—18 months o 2d—9 months o 2e—27 months Due Date: 5/31/2023 o 2a—2/28/2022 o 2b—2/28/2022 o 2c—5/31/2023 o 2d—8/31/2022 o 2e—12/1/2026
Timeline/Flow for Future Adopters	N/A
CAST Lead	FAA Safety and Technical Training (AJI), National Air Traffic Controllers Association (NATCA)

#	Organization(s)	Detailed Steps
2a	FAA Technical Operations (AJW), FAA ATO Office of Terminal Services (AJT), FAA AJI, and NATCA	Take existing ALM Joint Safety Analysis and Implementation Team (JSAIT) data and establish a periodic update to that data.
	Complete.	
2b	FAA AJW, FAA AJT, FAA AJI, NATCA	Identify the air traffic facilities where each of the specific technologies would be effective.
	Complete.	
2c	FAA AJW, FAA AJT, FAA AJI, NATCA	Based on available funding, determine the number of facilities that the technologies could be installed at (resource limit).
	Complete.	
2d	FAA AJW, FAA AJT, FAA AJI, NATCA	Identify where new technology can be implemented (air traffic facilities where ALM data indicates risk or where no data is available).
	Complete.	
2e	FAA AJW, FAA AJT, FAA AJI, NATCA	Update the list from step 2d periodically or as directed by CAST.

Note: See section III for detailed costs and resources.

	Complete.
Notes	

Note: See section III for detailed costs and resources.

SECTION III: SUPPLEMENTAL INFORMATION

Source Study	Approach and Landing Misalignment (ALM) Joint Safety Analysis and Implementation Team (JSAIT)
Related Initiatives	None

Total Cost

Organization	FTE	Units	Cost
FAA Air Traffic Organization (ATO) Cost	24	1	$6,000,000
National Air Traffic Controllers Association (NATCA) Cost	3	1	$750,000
Air Carrier Cost	0.1	64	$1,600,000
Air Carrier Labor Organization Cost	0.1	3	$75,000
Organization Cost	N/A	N/A	**$8,425,000**
Per Facility Cost	N/A	1	**$1,045,000**

$8,425,000 overall plus $1,045,000 per facility (technology installation)

Note: For labor, one Full-Time Equivalent (FTE) = $250,000

The below is an itemized list of technology installation cost per facility receiving new ground-based technology (based on sample estimate for installing Standard Terminal Automation Replacement System (STARS), which would enable ground-based technology, such as Arrival Runway Verification (ARV)).

Program Office Cost	$728,000	The Program Office cost includes all the electronics and display equipment, technical and installation support necessary from the Prime Vendor, and second level engineering.
Regional Engineering Support Cost	$113,000	The Regional Engineering Support cost includes the design and installation of the system infrastructure to include fiber optic communication lines, power, grounding, electronics rack, and monitor display workstation.
Federal Telecommunications Infrastructure (FTI) Cost	$124,000	The FTI cost includes equipment and labor as well as recurring service costs for the first 2 years.
Overhead Cost	$80,000	Standard FAA overhead rates were utilized in the estimate.

The below is a list of baseline costs for the whole National Airspace System (NAS), not directly related to individual facilities receiving new ground-based technologies.

SECTION III: SUPPLEMENTAL INFORMATION

	Organization	Resources Needed
Direct Resource Overview—Government	FAA ATO	• 24 FTE
	NATCA	• 3 FTE

	Organization	Resources Needed
Direct Resource Overview—Industry	Air Carriers	• 0.1 FTE per organization
	Air Carrier Labor Organizations	• 0.1 FTE per organization

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	None

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
0.2	08/04/2022	Actions 1 and 2 closed based on current and planned implementation at all Airport Surface Detection Equipment, Model X (ASDE–X)- and Airport Surface Surveillance Capability (ASSC)-equipped airports.
0.1	03/24/2022	Administrative change to correct Strategy field in— Action 1 in Section 1. Action 2 in Section 1.
Original	12/02/2021	*Start date based on CAST adoption.*