

## 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 (JSAT) 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 the industry develop and make available, on new transport category aircraft and major derivatives, enhanced aircraft design features as feasible, that increase flightcrew awareness of runway/taxiway/aerodrome ALMs. Applicable new aircraft programs include—

- New type certificate programs and
- Major derivative, amended type certificate programs involving redesign of flightdeck avionics.

Primary Risks  
Mitigated

Ground Collision (GCOL) and Runway Incursion (RI)

Action	Organization(s)	Strategy	Description	Due Date
Action 1	OEMs	Design	Manufacturers should develop and make available, on new transport category aircraft, enhanced aircraft design features as feasible, that increase flightcrew awareness of runway/taxiway/aerodrome ALMs.	11/30/2023

*Comments: CAST closed this action based on manufacturers reporting ongoing efforts to mitigate the risk of runway misalignments.*

See section II of this SE for detailed action descriptions.

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

**TABLE OF CONTENTS****SECTION II: DETAILED ACTION INFORMATION****PAGE 3***SE 235 consists of one action, which this section lays out in detail.*

- **Action 1 (Aircraft Manufacturers, Aircraft Manufacturer Industry Associations) .....****PAGE 3**  
Develop and make available enhanced aircraft design features

**SECTION III: SUPPLEMENTAL INFORMATION****PAGE 4***This section contains the following additional information that may be of interest to implementers:*

- Source Study
- Related Initiatives
- Total Cost/Resource Overview

**SECTION IV: REVISION LOG****PAGE 5***This section provides a history of revisions to this SE.*

## SECTION II: DETAILED ACTION INFORMATION

## Action 1: Develop and make available enhanced aircraft design features

 Primary  
 Implementer

Aircraft Manufacturers

Action Objective

Manufacturers should develop and make available, on new transport category aircraft, enhanced aircraft design features as feasible, that mitigate the risk of runway/taxiway/aerodrome approach and landing misalignment (ALM) events.

Action Timeline

Flow Time: 24 months

Due Date: 11/30/2023

Timeline/Flow for  
Future Adopters

N/A

CAST Lead

Aerospace Industries Association (AIA)

#	Organization(s)	Detailed Steps
1a	Original Equipment Manufacturers (OEM)	<p>Research and develop desired aircraft features that could reduce the likelihood of approach and landing misalignments. The features should relate to—</p> <ul style="list-style-type: none"> <li>a. Situational awareness technologies           <ul style="list-style-type: none"> <li>i. The ability to differentiate between open and closed runways.</li> </ul> </li> <li>b. Advisory technologies           <ul style="list-style-type: none"> <li>i. The consideration of expanding the envelope for which the advisory technologies function.</li> <li>ii. The ability to include the runway of intended landing as instructed by air traffic control (ATC) and as programmed into the flight management computer (FMC).</li> </ul> </li> <li>c. Alerting technologies           <ul style="list-style-type: none"> <li>i. The ability to include the runway of intended landing as instructed by ATC and as programmed into the flight management computer (FMC).</li> </ul> </li> </ul>
1b	OEMs	In conjunction with Step 1a, assess the desired features' feasibility and effectiveness. Create an implementation roadmap for feasible design features for new-type designs, major derivative programs, in-production cut-ins, and retrofits for existing in- and out-of-production-type designs.
1c	OEMs	Provide feedback to CAST on the desired features' feasibility and implementation plans.

Notes

In August 2023, OEMs reported runway misalignment mitigations are being considered within their internal safety and design teams and will be incorporated into aircraft, as feasible.

### SECTION III: SUPPLEMENTAL INFORMATION

<u>Source Study</u>	Approach and Landing Misalignment (ALM) Joint Safety Analysis and Implementation Team (JSAIT)	
<u>Related Initiatives</u>	SE 200, Airplane State Awareness—Virtual Day-VMC Displays SE 218, Runway Excursion—Overrun Awareness and Alerting Systems	
<b>Total Cost</b>	<b>\$50,000</b>	<i>Note: For labor, 1 Full Time Equivalent (FTE) = \$250,000</i>
<u>Action 1</u>	\$50,000	0.2 FTE [add 0.1 FTE for each aircraft manufacturer over one]

	Organization	Resources Needed
<i>Direct Resource Overview—Government</i>		<ul style="list-style-type: none"> <li>• N/A</li> </ul>

	Organization	Resources Needed
<i>Direct Resource Overview—Industry</i>	Aerospace Industries Association (AIA)	<ul style="list-style-type: none"> <li>• Action 1: 0.1 FTE</li> </ul>
	Aircraft Manufacturers	<ul style="list-style-type: none"> <li>• Action 1: 0.1 FTE, per manufacturer</li> </ul>

<i>Indirect Resource Overview</i>	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.				
	<table border="1"> <thead> <tr> <th>Organization</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>European Organisation for Civil Aviation Equipment (EUROCAE) Working Group 101</td> <td>This working group is investigating similar technologies as the ALM JSAIT and looking to mandate such technologies for air carriers operating in Europe.</td> </tr> </tbody> </table>	Organization	Description	European Organisation for Civil Aviation Equipment (EUROCAE) Working Group 101	This working group is investigating similar technologies as the ALM JSAIT and looking to mandate such technologies for air carriers operating in Europe.
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## 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
1	08/03/2023	Revision to scope and intent. Removed request to establish a working group to develop additional features; replaced with request for OEMs to establish features within their internal design processes. SE closed based on ongoing OEM efforts to mitigate the risk of runway misalignments.
Original	12/02/2021	<i>Start date based on CAST adoption.</i>

