

SECTION I: SE OVERVIEW

Study Topic Overview Summary CAST became aware of the risk of zero-flap takeoff attempts through ASIAs and industry presentations at Aviation Safety InfoShare. CAST requested ASIAs perform a directed study, which confirmed several instances of aircraft lining up on the takeoff runway with flaps set to zero. CAST chartered the Takeoff Misconfiguration Joint Safety Analysis and Implementation Team (TOMC JSAIT) to more closely examine the risk and recommend mitigation strategies.

SE Objective CAST recommends air carriers examine their own safety data to determine if they are at increased risk of takeoff misconfigurations, and if so, consider implementing actions outlined in this SE DIP to decrease the risk. Specifically, air carriers should assess current standard operating procedures (SOP) related to setting proper flap/slat configuration.

Primary Risks Mitigated Loss of Control-Inflight (LOC-I), Runway Excursion (RE)

Action	Organization(s)	Strategy	Description	Due Date
Action 1	Air Carriers	Procedures	Review and assess policies and procedures regarding setting takeoff flaps against recommended best practices.	04/30/2017
<p><i>Comments: CAST closed this action based on information from air carrier industry associations. CAST encourages air carriers that have not performed the assessment requested in this action to do so.</i></p>				
Action 2	Air Carriers	Procedures	Revise procedures as necessary in accordance with the results of Action 1.	04/30/2020
<p><i>Comments: CAST closed this action based on implementer feedback received to date.</i></p>				
Action 3	FAA AFS	Policy	Evaluate the increased potential for takeoff misconfiguration when publishing anti-icing holdover timetables that provide longer holdover times when anti-icing is performed with flaps retracted.	08/01/2017
<p><i>Comments: CAST closed this action based on publication of Winter 2017–2018 FAA Holdover Time Guidelines. CAST encourages air carriers to review the new guidance and make changes as needed to their policies and procedures.</i></p>				
Action 4	Aircraft Manufacturers	Procedures	Review and, if feasible, modify recommended aircraft configuration while deicing/anti-icing and while taxiing on slush-covered surfaces.	04/30/2017
<p><i>Comments: CAST closed this action based on manufacturer response on requested changes not being feasible.</i></p>				

See section II of this SE for detailed action descriptions.

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



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This section contains the following additional information that may be of interest to implementers:

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- Related Initiatives
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This section provides a history of revisions to this SE.



SECTION II: DETAILED ACTION INFORMATION

Action 1: Assess current policies and procedures

Primary
Implementer

Air Carriers

Action Objective

Air carriers should review and assess current policies and procedures for takeoff configuration and evaluate against recommended best practices derived from analysis of flight operational data and pilot reports for takeoff flap misconfiguration events.

Action Timeline

Flow Time: 6 months

Due Date: 04/30/2017

Timeline/Flow for
Future Adopters

CAST expects a 6-month flow time to be accurate for future implementers based on reports from initial implementation.

CAST Lead

Airlines for America (A4A)

#	Organization(s)	Detailed Steps
1a	Air Carrier Industry Assns.	<p>Communicate with air carrier members and provide results of the analysis undertaken by CAST regarding misconfigured takeoffs and the purpose of this CAST SE, including the following findings:</p> <ol style="list-style-type: none"> Flight operational data provided by industry shows an increased likelihood of an attempted flaps-up takeoff event when flaps are not set before taxi. The likelihood of an attempted flaps-up takeoff event increases during winter operations or operations that are more than 60 minutes behind schedule. Pilot narrative reports indicate the primary contributing factor of these events is flightcrews becoming distracted by internal or external factors and/or workload management.
<i>Complete.</i>		
1b	Air Carriers	<p>Review standard operating procedures (SOP) related to setting takeoff configuration and evaluate against the following recommendations:</p> <ol style="list-style-type: none"> Establish SOPs and procedures to configure takeoff flaps before taxi, consistent with operational requirements. If an air carrier determines that takeoff configuration cannot be completed before taxi, it should establish procedures, taking into account aircraft equipment, based on the following best practices: <ol style="list-style-type: none"> Tactile confirmation of the takeoff configuration warning system (TCWS) (for example, a “push-to-test” button or throttle burst procedure), if available for the aircraft type. Checklist procedures to manage the operations during which delayed flap configuration may occur, including— <ul style="list-style-type: none"> Deicing/anti-icing operations, Operations on slush-covered surfaces, Taxi with less than all engines running, Extended taxi delays that involve shutting down one or more engines or reconfiguring the aircraft, and Other distractions that may be unique to the air carrier’s operation.

Note: See Section III for detailed costs and resources.



SECTION II: DETAILED ACTION INFORMATION

- c. Regardless of when takeoff configuration is initially set, all carriers should have specific procedures for ensuring proper takeoff configuration in situations where aircraft performance data and/or departure runway are assigned or changed after taxi has been initiated.

As of June 2017, a significant number of air carriers have reported to their respective industry associations they meet the intent of this subaction.

1c Air Carriers

- Evaluate these recommendations against current SOPs and determine what, if any, revisions to policy, SOPs, checklists, and training may be appropriate for their operations. If an air carrier determines its SOPs are not aligned with the recommendations, the air carrier should perform a safety risk assessment under its safety management system (SMS) to assess what changes are needed or what alternative mitigations would be required to accomplish the intended reduction in risk. Air carrier actions are complete when the air carrier has—
- a. Reviewed existing SOPs for setting takeoff configuration.
 - b. Determined it meets the recommendations, has alternative risk mitigations in place, or has developed an implementation plan to modify SOPs as necessary.

As of June 2017, a significant number of air carriers have reported to their respective industry associations they meet the intent of this subaction.

1d Air Carrier Industry Assns.

- Track implementation of member carriers and report progress to JIMDAT and CAST.

Reported to JIMDAT and CAST in June 2017.

Notes



SECTION II: DETAILED ACTION INFORMATION

Action 2: Revise procedures

Primary
Implementer

Air Carriers

Action Objective Air carriers should revise their procedures as necessary in accordance with the results of Action 1.

Action Timeline Flow Time: 36 months (upon completion of [Action 1](#))

Due Date: 04/30/2020

**Timeline/Flow for
Future Adopters** TBD when CAST closes this action.

CAST Lead Airlines for America (A4A)

#	Organization(s)	Detailed Steps
2a	Air Carriers	Revise policies, standard operating procedures (SOP), checklists, and training as identified by the safety risk assessment results of the evaluation performed under Action 1.
		<i>Complete.</i>
2b	Air Carriers	Consult with aircraft manufacturers to determine whether changes made are consistent with current manufacturer recommendations.
		<i>Complete.</i>
2c	Air Carriers	Air carrier actions are complete when the air carrier has established SOPs, as appropriate, to mitigate the increased risk of setting takeoff configuration during the taxi phase (as indicated by industry-provided flight operational data and pilot narrative reports).
		<i>Complete.</i>
2d	Air Carrier Industry Assns.	Track implementation of member carriers and report progress to JIMDAT and CAST.
		<i>Complete.</i>

Notes



SECTION II: DETAILED ACTION INFORMATION

Action 3: Evaluate increased potential for takeoff misconfiguration

Primary Implementer

FAA Flight Standards Service, Safety Standards (AFS)

Action Objective

FAA AFS should evaluate the increased potential for takeoff misconfiguration (particularly attempted takeoff with flaps up) that occurs during winter weather operations in publishing icing holdover timetables that provide longer holdover times when anti-icing is performed with flaps retracted.

Action Timeline

Flow Time: 9 months

Due Date: 08/01/2017

Timeline/Flow for Future Adopters

FAA AFS included a statement in the holdover tables beginning in winter 2017–2018 for operators to consider the increased risk of takeoff misconfiguration when anti-icing with flaps retracted. Air carriers should perform a risk assessment each winter season to consider holdover time differences and risk of flap misconfiguration on takeoff.

CAST Lead

FAA AFS

#	Organization(s)	Detailed Steps
3a	FAA AFS	Evaluate the increased potential for takeoff misconfiguration (particularly attempted takeoff with flaps up) when publishing icing holdover timetables that provide longer holdover times when anti-icing is performed with flaps retracted. The assessment should account for the risk of increased rate of flap misconfiguration that has been observed in flight operational data for operations where the operator does not set flaps before taxi in cold weather operations. <i>Amended language in the Winter 2017–2018 FAA Holdover Time Guidelines.</i>
3b	FAA AFS	Track implementation and report status to JIMDAT and CAST. <i>Reported to JIMDAT and CAST in August 2017.</i>

Notes

SECTION II

Note: See Section III for detailed costs and resources.



SECTION II: DETAILED ACTION INFORMATION

Action 4: Review and modify recommended procedures

Primary
Implementer

Aircraft Manufacturers

Action Objective

Aircraft manufacturers review and, if feasible, modify their recommended procedures regarding anti-icing procedures and taxi on slush-covered surfaces with flaps retracted.

Action Timeline

Flow Time: 6 months

Due Date: 04/30/2017

Timeline/Flow for
Future Adopters

At the time of action completion, manufacturers reported it is not feasible to change their recommended procedures regarding flap position during anti-icing procedures and while taxiing on slush-covered surfaces. CAST encourages manufacturers to evaluate if recommending operations in these conditions with flaps in the takeoff position is feasible in new type designs.

CAST Lead

Aerospace Industries Association (AIA)

#	Organization(s)	Detailed Steps
4a	AIA	<p>Communicate with CAST-represented aircraft manufacturers and provide results of the analysis undertaken by CAST regarding misconfigured takeoffs and the purpose of this CAST SE, including the following findings:</p> <ol style="list-style-type: none"> Flight operational data provided by industry shows an increased likelihood of a takeoff flap misconfiguration event when flaps are not set before taxi. Pilot narrative reports indicate the contributing factors of these events are flightcrews becoming distracted by internal or external factors, non-routine operations, and/or workload management.
<i>Complete.</i>		
4b	Aircraft Manufacturers	<p>Evaluate their recommendations for setting the takeoff configuration during winter weather operations to ensure their procedures take into consideration potential operational aircraft design needs (such as protection of flap tracks, sensors, and actuators) and the potential for a misconfigured takeoff, particularly for—</p> <ol style="list-style-type: none"> Deicing/anti-icing operations, and Taxi through ice, snow, slush, or standing water in cold temperatures.
<i>CAST-member manufacturers have reported this evaluation is complete. No action taken – changes to current recommendations are not feasible.</i>		
4c	Aircraft Manufacturers	<p>Report completion to AIA (or JIMDAT, if not represented by an association), when manufacturers have finished their evaluation, made any feasible changes in recommended procedures, and provided any updated procedures to air carriers.</p>
<i>N/A</i>		
4d	AIA	<p>Track implementation and report progress to JIMDAT and CAST.</p>
<i>Reported to JIMDAT and CAST in June 2017.</i>		

Notes



SECTION III: SUPPLEMENTAL INFORMATION

Source Study Takeoff Misconfiguration Joint Safety Analysis and Implementation Team (TOMC JSAIT).

Related Initiatives

Total Cost	\$9,125,000	<i>Note: For labor, 1 Full Time Equivalent (FTE) = \$250,000</i>
Action 1	\$1,150,000	4.6 FTE
Action 2	\$7,800,000	Cost assumes all carriers have to make modifications.
Action 3	\$50,000	
Action 4	\$125,000	

	Organization	Resources Needed
<i>Direct Resource Overview – Government</i>	FAA AFS	<ul style="list-style-type: none"> Action 3: 0.2 FTE to perform safety risk analysis.

	Organization	Resources Needed
<i>Direct Resource Overview – Industry</i>	AIA	<ul style="list-style-type: none"> Action 4: 0.1 FTE.
	Air Carriers	<ul style="list-style-type: none"> Action 1: 4.4 FTE (55 air carriers @ ~0.08 FTE per carrier) to perform evaluation of current SOPs against recommendations. Action 2: Up to 0.56 FTE per air carrier, for up to 55 air carriers. <ul style="list-style-type: none"> 0.06 FTE per air carrier to revise policies, SOPs, and training. 0.5 FTE per air carrier to revise checklists, if needed.
	Air Carrier Industry Associations	<ul style="list-style-type: none"> Action 1: 0.2 FTE (assumes ~0.05–0.1 FTE per association) to track implementation and coordinate with CAST. Action 2: 0.2 FTE (assumes ~0.05–0.1 FTE per association) to track implementation and coordinate with CAST. <p><i>Note: 55 air carriers are represented by three CAST-member air carrier industry associations:</i></p> <ul style="list-style-type: none"> Airlines for America (A4A), Regional Airline Association (RAA), and National Air Carrier Association (NACA).
	Aircraft Manufacturers	<ul style="list-style-type: none"> Action 4: 0.4 FTE (4 manufacturers @ ~0.1 FTE per carrier).

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
FAA AFS	Inspector resources required for normal review and approval of air carrier training programs associated with Action 2 as part of duties performed.

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
1.1	04/07/2022	Action 2 closed.
1.0	09/17/2018	New SE format. Content reorganized and terminology updated. No substantive changes.
0.3	08/03/2017	Action 3 closed.
0.2	06/01/2017	Action 1 closed. Action 4 closed.
0.1	12/01/2016	Action 3 due date extended from 01/31/2017 to 08/01/2017.
Original	10/06/2016	CAST adopted SE 227.

