Runway Excursion Prevention

Air Carrier Self Audit Checklist

Purpose

The Flight Safety Foundation (FSF) Reducing the Risk of Runway Excursions report identifies a number of different risks, and includes recommended mitigations. This "Self Audit Checklist" is designed so that operators can evaluate their own training and operational policies, procedures and programs to ensure that they have minimized these identified risks.

This self audit checklist is not intended to comprehensively cover every conceivable risk factor that may result in a runway excursion, nor is it intended to override regulatory guidance or manufacturer's recommended practices. Air carriers are encouraged to enhance this checklist for their own use.

General		
Risk Factor to be analyzed or self audit question to be answered	**Answer**	**Status of implementation**
• Do you have a process to actively monitor risk during takeoffs and landings (such as a pilot incident reporting system and/or a Flight Data Analysis (FDA) program? ❖ Note: refer to the Risk Monitoring section of this checklist for more detail on FDA monitoring	☐ Yes ☐ No	
• Do your training programs address the fact that the presence of more than one runway excursion risk factor (i.e., contaminated runway, high crosswinds, MEL, etc) increases the overall risk?	☐ Yes ☐ No	
• Do you have a training program for pilots, dispatchers, and load planners for takeoff and landing performance calculations?	☐ Yes ☐ No	
TAKEOFF EXCURSION RISKS		
The runway excursion report identified four areas of risk that contribute to the majority of takeoff runway excursions: takeoff and landing performance calculations, proper Rejected Takeoff (RTO) accomplishment, aircraft directional control during takeoff, and proper aircraft loading.		

Takeoff Performance Policies, Calculations, and Training

Risk Factor to be analyzed or self audit question to be answered	Answer	Status of implementation
• Do you have a procedure that requires performance calculations for each takeoff, and each specific runway?	☐ Yes ☐ No	
• Do these training programs address all of the takeoff performance factors addressed by the aircraft manufacturer that affect takeoff performance?	☐ Yes ☐ No	
o Does your training program specifically address the effects of runway contamination (water, snow, ice, etc) on performance?	☐ Yes ☐ No	
o Does your training program specifically address effects of inoperative aircraft equipment (i.e., brakes, anti-skid, engine reversers, spoilers, etc) on performance?	☐ Yes ☐ No	
• Do these training programs identify operational limitations (crosswinds, tailwinds, wet runway limits, runway length, takeoffs with wind shear present, etc) for each aircraft type in accordance with the manufacturer's guidance?	☐ Yes ☐ No	
• Does your performance training program include a discussion of the following:	☐ Yes ☐ No	
o How takeoff distance is calculated	☐ Yes ☐ No	
o Balanced field length	☐ Yes ☐ No	
o Effects of MELs on takeoff performance and RTO performance	☐ Yes ☐ No	
o If reverse thrust is used in computing RTO distance	☐ Yes ☐ No	
o Assumptions of pilot reaction time during RTO's	☐ Yes ☐ No	

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Risk Factor to be analyzed or self audit question to be answered	Answer	Status of implementation
• Do you have a process to identify critical runways?	☐ Yes ☐ No	
• Have you defined a critical runway for each aircraft type with regard to the length of runway required, field elevation, obstacles, etc?	☐ Yes ☐ No	
• Do you monitor "non-critical" runways for changes that could cause them to become critical? (i.e., runway construction, contaminated runways, new obstacles, etc)	☐ Yes ☐ No	
Rejected Takeoff (RTO) policies, procedures, and training		
• Do your operational procedures define events for when an RTO should be performed (in accordance with the aircraft manufacturer's recommendations)?	☐ Yes ☐ No	
• Does your training program include discussions as to when it is appropriate to perform an RTO, and when an RTO is not the best choice (i.e., the go/no-go decision)?	☐ Yes ☐ No	
• Does your training program discuss when an RTO must be performed for engine failures at speeds well below V1?	☐ Yes ☐ No	
• Does your training program discuss the increased risk of an RTO as aircraft speed approaches V1 (especially at high takeoff weights), and the appropriateness of an RTO decision?	☐ Yes ☐ No	
• Does this training program address the amount of runway required for an RTO at airspeeds greater than V1, and the cases when an RTO above V1 will likely result in a runway excursion?	☐ Yes ☐ No	
• Does your simulator training program include: o Practice of RTOs, and the appropriate use of all available aircraft capabilities (brakes, spoilers, auto brakes, reverse thrust, etc)	☐ Yes ☐ No	

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Risk Factor to be analyzed or self audit question to be answered	Answer	Status of implementation
• Does your simulator training program provide for:		
o High speed RTO decision making (below, at, and above V1)?	☐ Yes ☐ No	
o Does your training program address aircraft control and the go- no-go decision following a takeoff tire failure?	☐ Yes ☐ No	
o Other mechanical failures that may require an RTO (ie, hydraulic failures, loud noises, vibrations, master warning lights, etc)	☐ Yes ☐ No	
• Training for mechanical failures that do not require an RTO (minor system failures, cabin interphone calls, etc)	☐ Yes ☐ No	
Directional control during takeoff training		
• Does your training program address directional control issues during crosswind and contaminated runway takeoffs? (i.e., the appropriate use of aircraft controls such as flight controls, the tiller, etc)?	☐ Yes ☐ No	
• Does your training program address the problem of directional control during a low speed RTO following an engine failure?	☐ Yes ☐ No	
o Does your training program discuss minimum control speed (Vmcg, as provided by the aircraft manufacturer) following an engine failure?	☐ Yes ☐ No	
o Does your training program provide simulator training for low speed RTO's (less than Vmcg), highlighting the requirement for an immediate reduction in thrust on the remaining engine(s)?	☐ Yes ☐ No	
• Does your training program address CRM and adherence to SOP's during an RTO?	☐ Yes ☐ No	
o Do your procedures and training programs address RTO procedures when the co-pilot is making the takeoff?	☐ Yes ☐ No	
o Do you have a clear operational policy as to who makes the "go, or no-go" decision during each takeoff (i.e., does the captain always decide, or is the decision made by the flying pilot)?	☐ Yes ☐ No	

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Aircraft Loading

Risk Factor to be analyzed or self audit question to be answered	Answer	Status of implementation
• Do you have written procedures to ensure that aircraft are loaded properly and in a standardized manner?	☐ Yes ☐ No	
• Do you have a process to measure compliance with aircraft loading procedures?	☐ Yes ☐ No	
o Do you monitor ramp crew loading (i.e., via audits of loads, reports of errors, etc)	☐ Yes ☐ No	
o Do you have a process for flight crews to report load errors, and pass on these errors to your ground operations department?	☐ Yes ☐ No	
o Do you have a process for ramp crews to report load errors (ie, found on arrival)?	☐ Yes ☐ No	
o Do you routinely report load procedural errors and compliance to senior managers in your ground operations organization?	☐ Yes ☐ No	
• Do you have written procedures to ensure that the flight crew properly configures the cockpit based on aircraft load information (i.e., flap, trim, airspeed and thrust settings?	☐ Yes ☐ No	
o Are both (all) pilot involved in verifying proper cockpit configuration?	☐ Yes ☐ No	
o Do you ensure that all critical Flight Management Computer/System (FMC/FMS) load data (aircraft weights, airspeeds, thrust settings, etc) are verified by both (all) pilots?	☐ Yes ☐ No	

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LANDING EXCURSION RISKS

The runway excursion report identified four areas of risk that contribute to the majority of landing runway excursions: un-stabilized approaches, the go-around decision, abnormal touchdowns and landings on contaminated runways.

Landing Performance Policies, Calculations, and Training

Risk Factor to be analyzed or self audit question to be answered	Answer	Status of implementation
• Do you have a process to ensure that pilots are informed of the current field conditions, including runway contaminants, winds, etc?	☐ Yes ☐ No	
• Do you have a policy that pilots must check landing performance (distance calculation, etc) against runway length on every landing?	☐ Yes ☐ No	
• Is the above information shared among the crew members? (i.e., do you require a landing briefing)	☐ Yes ☐ No	
• Do you use manufacturer authorized landing performance charts?	☐ Yes ☐ No	
• Is your performance data presented on easy-to-use cockpit material?	☐ Yes ☐ No	
o Do you audit your aircraft to ensure performance data material is current?	☐ Yes ☐ No	

Un-stabilized Approach

	Answer	Status of implementation
• Do you have an operation policy in your manual that requires a stabilized approach?	☐ Yes ☐ No	

Risk Factor to be analyzed or self audit question to be answered	Answer	Status of implementation
• Do you have specific criteria defined for a stabilized approach?	☐ Yes ☐ No	
o Do your criteria require that the aircraft be stabilized by a specific altitude above the runway?	☐ Yes ☐ No	
o Do your criteria require that the landing configuration be established by a specific altitude?	☐ Yes ☐ No	
o Does it include limits or errors in approach speed, specific airspeeds, configurations, thrust settings and glide path criteria?	☐ Yes ☐ No	
• Does your training program include examples of accidents that have occurred because of un-stabilized approaches?	☐ Yes ☐ No	
• Does your check standard make sure that the ability of pilots to make a stabilized approach will be checked?	☐ Yes ☐ No	
Go-around Decision		
• Do you have a written operational policy that you must execute go-around in un-stabilized conditions?	☐ Yes ☐ No	
• Do you have specific criteria that require a go-around?	☐ Yes ☐ No	
• Do you have a policy that a go-around will not be punished or even questioned by management (i.e., non punitive environment)?	☐ Yes ☐ No	
• Does your CRM course addresses the importance of assertion (especially by the co-pilot or other crewmembers) when the approach is not stabilized?	☐ Yes ☐ No	
• Are your co-pilots trained to call out whenever he or she detects un-stabilized conditions?	☐ Yes ☐ No	

Risk Factor to be analyzed or self audit question to be answered	Answer	Status of implementation
• Do you educate pilots so that they will execute go-around if a crew member calls out "go-around"?	☐ Yes ☐ No	
Abnormal Touchdowns		
• Do you have a policy with regard to abnormal touch down (i.e., mandatory go-round in case of landing long, bounce, touch down with high-speed, etc)	☐ Yes ☐ No	
• Are your pilots trained to judge what abnormal touchdown is?	☐ Yes ☐ No	
Contaminated Runways		
• Are your pilots trained regarding the effects of all types of runway contamination on aircraft stopping performance?	☐ Yes ☐ No	
• Do you have any operational limits regarding contaminated runway operations (e.g., minimum braking action reports, operational restrictions during heavy rain, etc)?	☐ Yes ☐ No	
• Do your MEL's include all of the manufacturer's restrictions regarding contaminated runways and inoperative systems?	☐ Yes ☐ No	
• Do you limit operations to the minimum necessary on contaminated runways with aircraft that have inoperative braking systems (spoilers, wheel brakes, anti-skid, reversers)?	☐ Yes ☐ No	
• Do you train your pilots to use maximum effective braking on contaminated runways immediately after touchdown, and not delay braking in these conditions? ❖ Note: These questions are not intended to be prescriptive, but to provide opportunities to reduce operational risk.	☐ Yes ☐ No	

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Risk Factor to be analyzed or self audit question to be answered	Answer	Status of implementation
Asymmetrical thrust • Do you have a procedure to make sure deceleration devices (speed brakes, symmetry thrust) are deployed properly (i.e. call outs by monitoring pilots, etc)?	☐ Yes ☐ No	
o Do you have an operational procedure for asymmetrical condition, and do you train your pilots to follow SOP?	☐ Yes ☐ No	
o Do you use reverse thrust in your contaminated runway stopping performance calculations?	☐ Yes ☐ No	
▪ If yes, do you have a contingency procedure if a thrust reverser failure occurs?	☐ Yes ☐ No	

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FLIGHT DATA ANALYSIS (FDA) or FLIGHT OPERATIONS QUALITY ASSURANCE (FOQA) RISK MONITOR PROGRAM SELF ASSESSMENT

This section of the self audit checklist provides air carriers with some of the best practices used in the industry in monitoring risk of runway excursions via FDA. It should be noted that many carriers select a sub-set of these specific events to monitor, and that there is no requirement for an FDA program to monitor 100% of these risk factors.

Risk Factor to be analyzed or self audit question to be answered	Answer	Status of implementation
• Do you have a FDA (or FOQA) program?	☐ Yes ☐ No	
• If no, the remainder of this checklist is not applicable.	☐ Yes ☐ No	
• Is data from your FDA program routinely reviewed by senior management?	☐ Yes ☐ No	
• Do you set goals for continuous improvement using FDA data (i.e., a 5% improvement in each category)?	☐ Yes ☐ No	

• Do you use your FDA program to increase your oversight and monitor performance at critical airports? Examples might be using FDA to monitor:
 	
  o thrust settings during takeoffs from short runways
 	
  o touchdown point and braking/spoiler/ engine reverse use on landing at short runways
	☐ Yes
	☐ No	

• Do you include FDA data in your aircraft maintenance program? Examples might be using FDA data to monitor:
 	
  o Low speed engine reverser use (resulting in potential FOD damage)
 	
  o Hard landings (resulting in potential landing gear damage)
 	
  o Excessive brake use (indicating potential errors in landing distance calculations)
	☐ Yes
	☐ No	

Takeoff FDA Monitoring Does your FDA/FOQA program monitor the following occurrences:		
Risk Factor to be analyzed or self audit question to be answered	**Answer**	**Status of implementation**
• Allowable flap settings and attempted no flap takeoffs?	☐ Yes ☐ No	
• Takeoff warning (i.e., configuration) occurrences?	☐ Yes ☐ No	
• Pitch angle (tail strike protection) on takeoff?	☐ Yes ☐ No	
• Thrust settings, or asymmetric thrust occurrences?	☐ Yes ☐ No	
• Inappropriate flight control inputs (i.e., roll or pitch control inputs, high speed steering tiller, inadvertent brake applications, dual pilot inputs etc)	☐ Yes ☐ No	
• Rejected takeoff occurrences?	☐ Yes ☐ No	
Landing FDA Monitoring **Does your FDA/FOQA program monitor the following occurrences:**		
• Unstable approaches?	☐ Yes ☐ No	
• Go-arounds from unstable approaches?	☐ Yes ☐ No	
• Correct selection of landing flaps?	☐ Yes ☐ No	
• Late runway changes (or excessive bank angles near the ground)?	☐ Yes ☐ No	
• Excessive tailwind during final approach?	☐ Yes ☐ No	
• Excessive airspeed at touchdown?	☐ Yes ☐ No	

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• Touchdown point (also known as deep landings) monitoring (i.e., where on the runway the aircraft touches down)?	☐ Yes ☐ No	
• Inappropriate pitch attitude at touchdown (i.e., tailstrike protection or very low attitude touchdowns)?	☐ Yes ☐ No	
• Overweight landings?	☐ Yes ☐ No	
• Hard landings?	☐ Yes ☐ No	
• Nose wheel first touchdown events?	☐ Yes ☐ No	
• Use of reverse thrust?	☐ Yes ☐ No	
• Use of automatic/manual ground spoilers?	☐ Yes ☐ No	
• Use of normal and/or auto-braking?	☐ Yes ☐ No	
• High runway turnoff speed (especially on non-high speed turnoffs)?	☐ Yes ☐ No	

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