International Civil Aviation Organization

WORKING PAPER

A38-WP/302
TE/132
12/9/13
English only

ASSEMBLY — 38TH SESSION

TECHNICAL COMMISSION

Agenda Item 38: Other issues to be considered by the Technical Commission

MEASURES FOR PREVENTING RUNWAY EXCURSION CAUSED BY UNSTABILIZED APPROACH

(Presented by the Republic of Korea)

EXECUTIVE SUMMARY

This paper proposes measures for preventing runway excursion caused by an unstabilized approach. These are pro-active, preventative measures to avoid runway excursion when an aircraft is in its final approach. The most effective way to prevent runway excursion caused by an unstabilized approach is to make a go-around at a proper height. This paper also suggests that the flight crew should be educated and trained according to the flight operational quality assurance (FOQA) analysis in order to make a go-around and to take both re-active and pro-active preventative measures simultaneously

Action: The Assembly is invited to:
a) recommend the FOQA analysis of air carriers to prevent unstabilized approaches; and
b) review measures to provide educational and training programs to pilots.

Strategic Objectives:	This working paper relates to the Safety Strategic Objective.
Financial implications:	Not applicable.
References:	Annex 6 — *Operation of Aircraft* Doc 9841, *Manual on the Approval of Training Organizations*

1. INTRODUCTION

1.1 Runway excursion has become a significant accident issue despite advances made in aviation technologies. Over the past 25 years, 33 per cent of fatal accidents have been related to runway excursions.

1.2 Between 1991 and 2013, eight fatal accidents have resulted from unstabilized approaches in the Republic of Korea (ROK), accounting for approximately 50 per cent of total runway excursions.

1.3 The flight operational quality assurance (FOQA) analysis of Korean air carriers showed that a total of 725 unstabilized approaches (3.7 per cent) occurred in 2010. Amongst those, 34 cases (7.2 per cent) made an unstabilized landing (0.26 per cent out of the total). Pilot ability is a significant factor in this issue, since pilots who made an unstabilized approach demonstrated low flying time in general.

1.4 Unstabilized approach is one of the main causes of accidents attributable to runway excursions; however if a go-around is made at the proper height, such as when an undesired aircraft state (UAS) occurs, a significant number of runway excursion accidents could be prevented.

1.5 After conducting an FOQA analysis, the pre-emptive measure of providing education and training to pilots who did not make a go-around when their aircraft was out of the stabilized approach standard should be instituted. This will help to proactively prevent possible runway excursions caused by unstabilized approaches.

2. DISCUSSION

2.1 Necessity of improving operations during unstabilized approach

2.1.1 The following are the major causes of unstabilized landing as concluded by an analysis of unstabilized approaches and landing accidents that have occurred in the ROK:

a) failure to be aware of the situation;

b) continuous landing attempts without making a go-around at a proper height; and

c) delayed go-around decision.

2.1.2 In the ROK, 52 out of 725 unstabilized approaches called for a go-around, but a go-around was made in only 18 of these 52 approaches. This demonstrates the reluctance that pilots have to follow normal procedure and make a go-around. Hence, a key factor in unstabilized approach management will lie in making pilots abide by the normal procedure of making a go-around.

2.2 Management of unstabilized condition

2.2.1 The best response to an unstabilized approach is a go-around. Any potential threat should be predicted and proactive measures established in advance (e.g. approach briefing).

2.2.2 Education will help pilots to develop the abilities required to recognize an unstabilized approach condition. In particular, behavioral training programs including flight simulators and go-around training programs can help pilots to gain a better understanding of the situation as well as to develop cognitive abilities to appropriately perform their roles.

2.3 Measures for preventing unstabilized approach

2.3.1 The FOQA analysis is performed on air carriers in accordance with the aviation act of the ROK. If analysis of the data reveals any cases of unstabilized approach, the pilots responsible will receive education and training.

2.3.2 Pilots who did not make a go-around during an unstabilized approach will board a simulator to receive correctional training and will later have additional training on the ground. These training programs have been proven to be of assistance for improving the pilot judgment regarding a go-around when facing an unstabilized approach. No sanctions will be imposed on a pilot who makes a normal go-around in response to an unstabilized approach.

2.3.3 Other measures may be developed by utilizing case studies of accidents or analyzed data regarding the LOSA, the LOFT or the FOQA analysis in order to prevent any possible unstabilized approaches.

2.4 FOQA analysis, the best third safety guard

2.4.1 There are various measures available to perform the role of the third safety guard, such as the ACARS, the LOSA, the LOFT, the safety report and the FOQA analysis. The FOQA analysis is considered to be the best of these methods in light of the frequency of abnormal situation occurrences in terms of economic feasibility, because the FOQA analysis:

a) is inexpensive;

b) determines and examines the originating conditions of events (excess/shortfall);

c) analyzes data accurately (animation functionality); and

d) affects observation, by improving a pilot’s safety awareness.

2.4.2 The FOQA analysis, as the third safety guard, is able to conduct a follow-up analysis on the ground and monitor unstabilized approaches. Pilots will be aware of the FOQA analysis and be able to recognize the necessity of a go-around when facing an unstabilized approach.

2.4.3 Pilots have a strong urge to attempt landing during an unstabilized approach, being reluctant to do a go-around. A procedure shall be established ensuring the third safety guard will make pilots follow a go-around procedure during an unstabilized approach. In this way, when a stabilized approach standard is exceeded, pilots will make a decisive go-around, and ultimately prevent any possible runway excursion.

2.4.4 It has been established that on the ground the FOQA analysis has a positive influence over pilots in flight and that it plays an important role as a preventative measure for dealing with an unstabilized approach.

2.5 **Results of the FOQA analysis performance as the third safety guard**

2.5.1 Analysis of Unstabilized Approach by Years

	Period	Aircraft	The number of unstabilized approaches	Go-around		No go-around	
1	Apr. 2009 ~ Mar. 2010	19,823	52 (0.2623%)	18	36%	34	68%
2	Jan. 2011 ~ Oct. 2011	14,326	27 (0.1884%)	14	52%	13	48%
Result			Down 71.8%	Up 69.2%		Down 70.5%	

The number of unstabilized approaches was reduced by 71.8 per cent after conducting the FOQA analysis and providing education and training to pilots. The number of go-arounds made during an unstabilized approach increased by 69.2 per cent. No go-around events also decreased by 70.5 per cent.

2.5.2 It can be concluded that the FOQA analysis by itself can play the role of third safety guard to pilots in flight.

2.5.3 There are numerous ways to set up the third safety guard to prevent unstabilized approaches, but as in the above-mentioned explanation, the FOQA analysis has many advantages as a third safety guard.

2.6 **Third safety guard based on the FOQA analysis**

2.6.1 Procedure:

a) obtain the QAR data after flight;

b) obtain data quickly upon a request from a pilot;

c) run the FOQA analysis program to extract any event that falls outside the standard;

d) analyze the event data and conduct analysis to verify unstabilized approach-related issues;

e) check whether a go-around is needed when an unstabilized approach occurs;

f) send a questionnaire to pilots who did not make a go-around to inquire about the situation at the time;

g) compare the FOQA Analysis and the questionnaire;

h) consult with the pilot based on the analyzed data and analyze flight operations;

i) train pilots who did not make a go-around;

j) provide a simulation program to pilots so that they can practice making a go-around during an unstabilized approach;

k) implement feedback measures that gain an understanding about the event in order to possibly reconsider related regulations or establish responsive measures; and

l) inform the flight crew about necessary information.

3. CONCLUSION

3.1 This paper proposes setting up a third safety guard in order to have pilots make a go-around, and this prevents landing accidents caused by an unstabilized approach.

3.2 An FOQA analysis shall be conducted. To date, education and training provided to pilots has reduced the number of unstabilized approaches by 71.8 per cent. The number of go-arounds made during an unstabilized approach soared by 69.2 per cent. Moreover, occurrence of a no go-around decreased by 70.5 per cent.

3.3 This paper proposes that Member States strive to form conditions in which pilots can make a go-around without hesitation when faced with an unstabilized approach. It should be emphasized that pilots will be free to do a go-around and will not face any subsequent criticism or pressure to write a report on having made the go-around.

3.4 If a go-around was not made during an unstabilized approach, the necessary education and training will be provided to pilots so that the same situation will not be repeated in the future.

4. ACTIONS BY THE ASSEMBLY

4.1 The assembly is invited to review the proposals and add the following matters in the *Manual on the Approval of Training Organizations* (Doc 9841) in either Chapter 3 — *Training and Procedures Manual* or Chapter 4 — *Quality Assurance (QA)* as a recommendation in order to prevent unstabilized approaches:

a) FOQA analysis on air carriers; and

b) measures to provide educational and training programs to pilots who did not make a go-around during an unstabilized approach.

— END —