

6 RECOMMENDATIONS

Based on the findings and conclusions the Dutch Safety Board made the following recommendations.

The Dutch Safety Board made the following recommendations to the regulators involved with the manufacturing of transport category aircraft; European Aviation Safety Agency (Europe), Federal Aviation Administration (USA), Agência Nacional de Aviação Civil (Brasil), Civil Aviation Administration of China, Federal Air Transport Agency (Russian Federation), Japan Civil Aviation Bureau, and Transport Canada.

1. Information and awareness

Ensure that the established False Glide Slope characteristics and the possible associated consequences for aircraft are made widely known and are modified accordingly in the published manuals and training material used in the aviation sector. This specifically refers to:

- a. the area above and below the published or nominated ILS Glide Path;
- b. the absence of warnings in the cockpit when flying with the automatic flight systems engaged in the area above the published or nominal ILS Glide Path.

2. Short term measures

Ensure with oversight that aviation operators, manufacturers, and Air Navigation Service Providers take mitigating actions to prevent pitch-up upsets due to aircraft exposure to False Glide Slope Reversal as a result of flying with the automatic flight systems engaged in the area above the published or nominated ILS Glide Path. This can be achieved by means of:

- a. operational measures;
 - raising the interception of the ILS Glide Slope from below to a Standard, or in the event of an interception from above,
 - developing additional operating procedures.
- b. technical measures;
 - automated on-board systems when in use should not cause a pitch-up upset, at least not without a preceding clearly recognizable warning and with ample time for flight crew intervention.

3. Long term measures

Stimulate that aircraft manufacturers in the long term develop new landing systems to accommodate new approaches for aircraft with automatic flight systems engaged and ensure that airports are equipped with these landing systems.

4. Occurrence reporting and analyses

Assess the aviation Safety Management System occurrence reporting and analyses methodology, including the use of the existing ECCAIRS databases on the levels (operator, Air Navigation Service Provider, manufacturer, national-international level) whether measures are required to achieve the goal of the system to identify potential safety deficiencies in a timely manner. The review should also take into account: (a) the possibility to add internal investigation results into the ECCAIRS databases (feedback-loop), (b) the necessity to exchange investigation information with the manufacturer.

5. Training regulations

Review the applicable regulations on initial and recurrent flight crew training to assess whether they adequately address the potential degradation of situational awareness (basic pilot skills) and flight path management due to increased reliance on aircraft automation by flight crews.

The Dutch Safety Board made the following recommendation to the International Civil Aviation Organization.

6. International regulations

Raise the recommended procedure in paragraph 8.9.3.6 (*ICAO Document 4444 PANS - ATM*) to intercept the published or nominated ILS Glide Path from below to a Standard.

In the event that interception of the Glide Path from below is not adopted as a Standard, horizontal and vertical operating landing gate limits need to be added to prevent aircraft exposure to pitch-up upsets due to False Glide Slope Reversal.

The Dutch Safety Board made the following recommendation to the Flight Safety Foundation.

7. Update of stabilised approach criteria

Update the Approach and Landing Accident Reduction (ALAR) toolkit stabilised approach criteria to include guidance to prevent pitch-up upsets due to aircraft exposure to False Glide Slope Reversal in the area above the published or nominal Glide Path.