

Pierrefonds (Montreal), Canada, December 14th 2020

To: Mr. Patrick Ky, Director-General, EASA
From: Gilles Primeau, B.Eng., M.Eng.
Subject: 737 MAX revised MCAS unsafe latent failure condition in MVS algorithm

Dear Mr. Ky,

I recently developed a simulation of the above-referenced segment, compliant with the descriptive provided in the FAA NPRM documentation, and in which I have strong confidence.

This simulation allowed the identification of the following specific latent & unsafe failure condition:

Any event affecting one of the two AOA vanes (resulting from a bird strike, or an unnoticed strike in ramp operations, etc.) causing a reduction of the affected vane's AOA value readout, by a magnitude of 5.5 degrees or less (i.e. the split-vane monitor threshold), will result in the MVS output feeding an erroneous, misleading and unsafe input to the MCAS, effectively rendering it inoperative.

To be more precise, this *latent / unannounced* condition will mislead the crew, in the event of a required subsequent maneuver intended for clearing an obstacle or avoiding a collision. The crew will falsely have confidence that the MCAS will intervene, should the crew maneuver be too aggressive and enter the domain which required the implementation of the MCAS. *The MCAS intervention will be delayed in terms of AOA trigger value until the true AOA value reaches a value higher by the magnitude of the affected vane disruption, and which could be too late to prevent a stall.*

Mr. Ky, in my considerable experience working with TCCA on similar situations, I am acutely aware that this type of misleading unannounced failure condition is of the worst possible kind, that would typically trigger the certification authorities to not allow, and require a corrective design change.

Furthermore, it should be noted that (a) this failure condition defeats TCCA's mandated two simulator-based training modes i.e. with and without MCAS active based on relying on correct MCAS health status reporting (i.e. *annunciated compromised MCAS state*), and (b) it is my current opinion that the only remedy to this situation would consist in coercing the implementation of a true independent 3rd AOA source, which I understand the EASA wishes to mandate, but which should precede re-certification.

On the basis of what precedes, on December 3rd 2020 I officially advised TCCA of the finding and expressed my recommendation for TCCA to immediately advise the FAA. Today and on the same urgency basis, I am informing you of the same, and will follow-up with a formal comment filing by the deadline of EASA's commenting process; this letter aims at ascertaining the filing sufficient attention.

Sincerely,

Gilles Primeau

Attachments: Excel simulation file, accompanying explicative document, condensed resume