



**FAA**  
**Aircraft Certification Service**  
**Transport Airplane Directorate (TAD)**

**1. Quantitative Risk Assessment**

Random Transport Airplane Risk Analysis (R-TARA) Version 2.4.2 10/20/2016

COS Item Number(s)	2016-xxxx	Airplane Model	737 MAX
COS SI Number	16-SI-xx	Branch	AIR-780
MSAD Event Number		Engineer	
MSAD SI Number		Analysis Date	12/3/2016

**CONDITION UNDER STUDY**

Lion Air 737-8 (MAX) crashed about 10 minutes after takeoff from Jakarta, Indonesia, October 29, 2018.

**SUSCEPTIBLE CONDITION (CP<sub>1</sub> and CP<sub>2</sub>)**

Describe any particular configuration that puts the airplane at risk. If all airplanes are affected, all the time, then CP<sub>1</sub> = CP<sub>2</sub> = 1. CP<sub>1</sub> represents the probability of a latent failure, and is calculated below (see Cell F42). CP<sub>2</sub> represents the probability of flying in a critical condition (including cargo loading, passenger configurations, fuel load, etc. but excluding latent failures).

**INITIATING EVENT (F)**

One accident to date in approximately 135,980 cycles and 372,754 flight hours flown

**CAUSAL CHAIN (CP<sub>3</sub>)**

Describe how the event leads to the unsafe outcome. CP<sub>3</sub> is the probability t at the event will lead to the unsafe outcome, for airplanes that are flying in the susceptible condition.

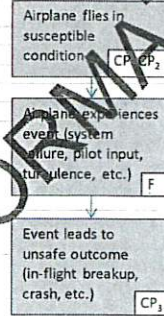
**UNSAFE OUTCOME**

Uncontrolled Crash, IR = 1.05

Adding not-yet-delivered airplanes 250 airplanes now, 400 average over the entire program.

Per Flight Global database as of 11/25/18, Boeing has ordered 264 Max airplanes, and orders for 4554, total of 4818. Rounding off to 4800 airplanes.

This page assumes Interim action reduces the risk by a factor of 100. We still need HP, NPRM or IAR.



ANALYSIS IS IN: Flight Hours

TARAM Handbook Variables	Total Uncorrected Fleet Risk	Uncorrected Individual Risk	Control Program fleet risk	Control Program Individual Risk	90-day Fleet Risk	Description
F	2.683E-07	2.68E-06	2.68E-06	2.68273E-06	2.68E-06	Frequency of Occurrence (per flight hour)
U-T	113697.5					Remaining life (flight hours, per airplane)
Sigma	4800		300		250	Number of airplanes in affected fleet (average over fleet life)
CP <sub>1</sub>		1		1	1	Probability of latent failure
CP <sub>2</sub>	1		1	1	1	Probability of flying with critical cargo loading / passengers / fuel / etc.
CP <sub>3</sub>	0.01	0.01	0.01	0.01	0.01	Probability that event causes unsafe outcome, given that airplane is in susceptible condition
IR	1.05	1.05	1.05	1.05	1.05	Injury ratio
EO			190			Exposed occupants
U (FH)			8.9		8.9	Utilization (flight hours/day)
U (FC)			4.5		4.5	Utilization (flight cycles/day)
CAD			112			Corrective Action Development (days)
RT			14			Rulemaking Time (days)
CT			30		90	Compliance time (days)

Risk Measures	Guidance Value	Calculated Value	Recommendation
Total Uncorrected Fleet Risk	0.02	15.373	Issue an AD
Total Uncorrected Fatal Events	N/A	14.6	Issue an AD under new guidance
Total Uncorrected Fatalities	3	2920.9	
Uncorrected Individual Risk	1.00E-07	2.82E-08	
Control Program Fleet Risk	3	2.01	
CPFR (Weighted Events)	0.02	0.01	
Control Program Indiv. Risk	10 <sup>-5</sup> , 10 <sup>-6</sup>	2.82E-08	
90-day Fleet Risk	N/A	1.07E+00	
NPRM Prioritization Rating	N/A	19.2	High Priority