



Data analyzing about the crashes of Boeing 737 max

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Abstract: From the advent of technology development, humanity is constantly enthusiastic to improve the quality of life more and more. Although humans tried hard for achieving their goals, sometimes they didn't succeed completely but they learned many things. For instance, many crashes of airplanes in the aviation industry can teach good experiences to humanity. As a result, we are using these experiences in order to improve the aviation industry more and more, but with fewer mistakes in the future. Anyway, in this article, we will analyze some information about the two crashes of Boeing 737 max.

INTRODUCTION

Boeing 737 is one of the most popular airplanes in all around the world. Boeing 737 max is the fourth generation of 737 narrow body twin-engine family which did its first flight in 2016. Anyway, crash of lion Air Flight 610 had made some doubts about b737 max and after that Ethiopian Airlines Flight 302 crash had rocked the aviation industry about this modern airplane. Here, the author of this essay will discuss that why Boeing performed poorly within five months and what was the technical problem of this airplane which caused the crashes of these two flights.

COMPETITION BETWEEN BOEING AND AIRBUS

Nowadays, Boeing has covered 38% of aviation industry and this percentage for Airbus is around 28%, so the remained 34% is covered by other companies like Embraer, McDonnell Douglas and so on. Among all of these commercial airplanes, a320 and b737 are strongly popular in aviation industry.

In November 2010, Airbus planned to develop its most popular airplane and it announced a new product and the name of that was a320neo which was the upgraded version of a320 family. The engines of this version are bigger than before, neo in stand for new engine option. The advantages of having bigger engines, was able to obtain attraction of airlines from all around the world.

As a result, it is clear that Boeing is not enthusiastic to lose the markets in the world and it was the main reason that Boeing planned to introduce its new product. Like Airbus, Boeing decided to develop its most popular product which was 737 with a bigger engine. But there was a big problem. Engines of this type of aircraft are really close to the ground rather than a320, so there is not enough space to improve the engines of 737.

However, in March 20, 2019 Boeing said: " We figured out a way to get a big enough engine under the wings". Actually, they found a good solution in order to develop the engine of this

type of aircraft and that was moving up the engines. Then, this new and modern airplane became a trend in aviation industry and Boeing was able to be strong in the aviation industry markets again such that Boeing received 914 orders from all around the world. In the official video of updated 737 which Boeing called this model 737 max, it is obvious that the top of the engine is above the wings. Anyway, as time was passing by, competition between Airbus and Boeing became harder.

REVEALING A NEW PROBLEM AND BOEING SOLUTION

Usually, the typical takeoff angle for this type of airplane is around 10 and 15 degrees. During the flight tests, one problem appeared suddenly. As it mentioned before, the engines of 737 max is bigger than the previous generation so it has more power. When the airplane was in full thrust especially during takeoff and climb, the nose of the airplane goes upward without considering the safe angle of flight and it is really dangerous because this problem can lead the airplane to Stall. It was a really big problem for 737 max but Boeing didn't change anything in engine design and just they added new software to the airplane. Whenever airplane nose goes up more than safe angle, this sensor pushes down the nose to the safe angle by getting the help from stabilizers. The name of this new installed system is MCAS and it is stand for 'maneuvering characteristics augmentation system'. On the other hand, because this generation was almost as same as the previous one, pilots need minimal training in order to fly this airplane and Boeing considered two-hour pilot training course for this airplane. Unfortunately, the new specified training course didn't mention the new installed software which was MCAS.

In the following, we will analyze the data of the two important crashes of this airplane for any signs of technical problem. The estimated problem is the interference of MCAS sensor with auto pilot system.

FLIGHT ANALYZE

Let's analyze two important crashes of Boeing 737 max in the following.

LION AIR, FLIGHT 610: OCTOBER 29, 2018:

13 minutes after takeoff, the airplane crashed into the Java Sea that caused deaths of all 189 passengers and crews. Let's take a look to the following data which has presented in figure one. By paying attention to the presented information, between 23:22 and 23:24, the speed is increasing, also it is clear that the plane is reducing altitude, so what is that all about?

It is obvious that the nose had pushed down but pilot tried to pull up the nose! This diagram is expressing the first minutes of the flight and as we know it is during climbing and takeoff engines are in full thrust. as Boeing said, MCAS system will automatically push the nose down to the safe angle, so probably, the MCAS system didn't work correctly in that time and pushed the nose down more than is needed! Anyway, let's look at the diagram of this flight:

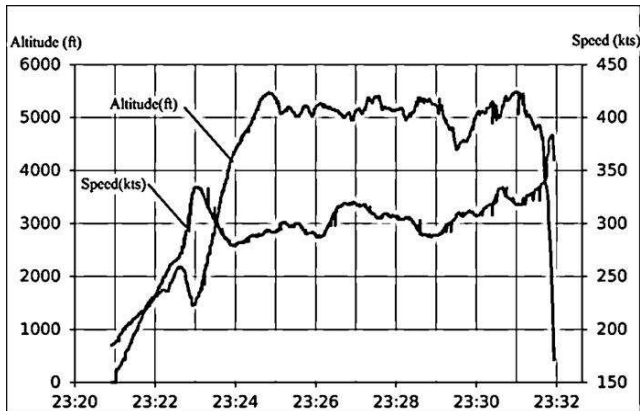


Figure 1. Details of the flight JT610

And finally, you can see at the last moment of the flight diagram, the same problem happened and caused the crash of this airplane. By having this background information, let's jump to the next crash of this airplane and check some information about it.

ETHIOPIAN AIRLINES, FLIGHT 302: MARCH 10, 2019:

A few moments after takeoff, this airplane crashed and all 157 on board people have

died. A source which had access to air traffic control tower recordings, said the before crash, this airplane had an unusual high speed. Then, immediately pilot requested to climb and make a right turn to get back to the airport but in 10800 feet the plane vanished from the radar.

In the following diagram, you can see the situation of airplane was unstable. By paying attention to vertical speed, we can realize in some moment the climbing rate reduced, it means that the nose of the airplane has pushed down by MCAS system but pilot had turned off the auto pilot system in order to control the airplane manually and pulling up the nose. Anyway, let's take a look to the flight details as a diagram:

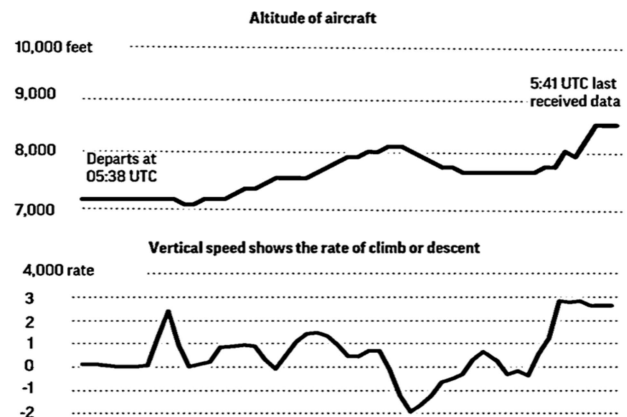


Figure 2. Details of flight ET302

CONCLUSION

In conclusion, the author of this article tends to explain that currently, Boeing is working on software system of autopilot. Actually, as times passes by, science progresses more and more, also we earn more experiences.

As a result, more Knowledge can cause fewer errors. Overall, the world is approaching to great days in near future.

Acknowledgment

I am really grateful to all of those who taught me to learn and I was honored to meet them

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