

Effects of weather conditions on aircraft performance essay sample

[Engineering](#), [Aviation](#)



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\n[toc title="Table of Contents"]\n

\n \t

1. [Essay](#) \n \t
2. [Conclusion](#) \n \t
3. [References](#) \n

\n[/toc]\n \n

Essay

Introduction

Air transport is considered to be one of the most weather-dependent industries. To ensure the normal operation the most complete, detailed information about the current and expected weather conditions is required. Meteorological conditions have a vital influence not only on the economic performance of the vehicles, but as well on traffic safety, on which numerous lives and health of passengers depend every single day. According to the International Civil Aviation Organization (ICAO) weather conditions have been officially recognized as the cause of 6 to 20% of accidents for the last 25 years, and that is not taking into account the number of cases that were indirectly caused by poor weather conditions.

Weather conditions that might cause a flight to be delayed, or crash are called weather minima. These include the visibility, the altitude of clouds, the wind speed, directions for pilots, the type of aircraft, and airfields. When those weather conditions are below the actual minimum, the operation of aircrafts is strictly prohibited for safety reasons. That is the reason for improvement of the airborne and ground equipment systems. Weather

conditions that are dangerous to aviation include thunderstorms, squalls, fog, ice, heavy rains, hail, blizzards, dust storms, low clouds, air turbulence. Static electricity in the clouds is another danger that is worth mentioning, as well, as snow drifts, slush and ice on the runways, and treacherous wind changes.

Air perturbation during a thunderstorm is one of the most dangerous phenomena in the aircraft industry. This phenomenon is capable of throwing the aircraft into turbulence, even if the plane is equipped with all of the necessary stabilization technology, and is piloted by a professional. Powerful ascending and descending air currents inside the clouds pose a great threat to the aircraft and the crew, along with a bit possibility of the aircraft being struck by lightning.

A lightning strike (a static discharge) occurs often during thunderstorms, in which the airplanes simply cannot avoid falling into. In most cases, the damage done to the aircraft by lightning is not that serious, however, they always entail high costs. During the lightning the onboard antennas get affected on, and as a result such aircraft must be withdrawn from service, with all of its communication and navigation equipment checked and re-adjusted, if needed. The needed scan of the entire aircraft and the repair of damaged parts lead to the loss of expensive flying time and profit. For this reason aircrafts are equipped with the needed means of lightning protection. Such a protection is a metal airframe that protects passengers and crew inside the aircraft from lightning. Modern airplanes can be fully protected against lightning by taking simple appropriate measures during the aircraft manufacturing.

Everyone who flew in the disturbed air is probably familiar with turbulence that often becomes the main danger that brings the plane down. Continuous and sharp changes of speed and direction of air flows are the main causes of the chaotic. Sudden gusts of wind of large velocity can greatly increase the load acting on the plane, which rises with the increasing speed of air and the speed of the aircraft.

Fog is another threat that pilots face in their everyday routine. Aircraft Accident Analysis of the period from 1947 to 1953 indicates that the loss of direction during takeoff, immediate crashes after takeoff or climb, landing on an uneven fields, landing on the runways, aircrafts rolling out beyond the runways, crash landings on instruments , etc. took place mainly because of limited visibility caused by fog. And it is regardless of any geographical area that limited visibility at fog continues to be one of the major problems during takeoffs and landings of the aircrafts.

Hail is still one of the most dangerous phenomena for the aircraft, when flying in a thunderstorm, despite statistics stating that death of aircrafts caused by hail is very rare. Hail mainly damage the forward, the front glass lantern, and wing leading edge, and when even flying at normal cruising speed hail produces a lot of cracks. The degree of the inflicted damage by hail depends on the size of hail grain, on the flight speed, and on strength of the aircraft fuselage materials.

The danger of icing can lead to the deterioration of the aerodynamic properties of the aircraft, the loss of its resilience. When the icing occurs the pilot must know the reasons for the ice formation, and should be to deal with such situation. For this pilots should avoid areas where icing is possible.

Conclusion

Aircraft safety on the ground and in the air is the most important issue of the aviation. Each flight is based on meteorological conditions, and the success of flights is only possible with proper accounting of the actual state and the expected changes in the weather.

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