



# Averting Disaster in Airplane Automation

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## ABSTRACT

Over the last 11 years, there have been over 150 self-reported incidences of mismanagement of automation for general aviation. It can be assumed that the number of actual events is much higher. By utilizing the Aviation Safety Reporting System (ASRS) database to analyze the 150 plus incidents, automation dependency is a clear issue. These reported incidents were categorized to gain a better understanding into the causes of errors and outcomes. Results indicated automation malfunctions and automation dependency were key contributors that led to the self-report. Based on this data, recommendations on how to mitigate the overuse of automation in general aviation were outlined. Additionally, recommendations for database use were also discussed.

## INTRODUCTION

As automation technology gets more complex each year, it also becomes more accessible not only to new generation commercial aircraft, but to the smaller general aviation airplanes as well. The fundamentals of flying an aircraft are affected by this and can impact the manual flying skills of pilots. It is concerning that pilots are consciously aware of automation errors and how it may affect their own flying abilities, yet the same errors are made frequently based on past reports and research.

## MATERIALS AND METHODS

The design of this study is to gather incident reports on various automation issues using the Aviation Safety Reporting System (ASRS) database. The database lists various incidents that are anonymously self-reported by pilots through a system designed by NASA.

Incidents from the ASRS database were filtered out based on the following criteria and keywords:

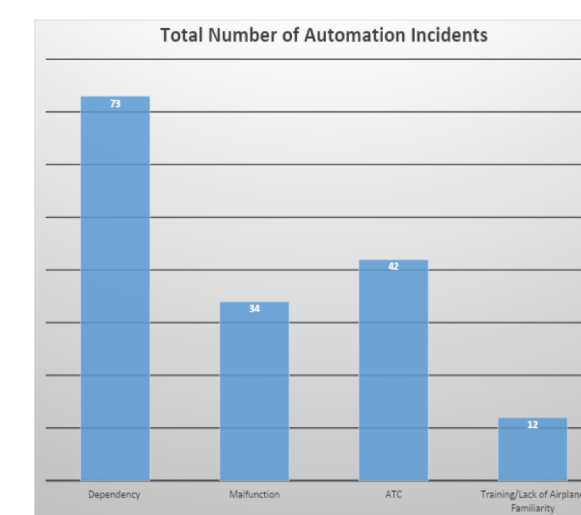
- Date: January 1, 2007 to December 31, 2018
- Country: United States of America
- Operation: Part 91 Operations
- Text - "Automation"

The idea was to gather as many recent reports highlighting automation errors and dependency as possible. By reading the narratives of each report, the data could be categorized and counted to understand which were the most common errors involving automation.

## RESULTS

By using the ASRS database, the data collected was put into categories signifying the type of automation error taking place in each incident retrieved from the search results.

- There were four main categories in which descriptive data was provided: Automation Dependency, Automation Malfunction, ATC, and Training/Lack of Familiarity
- A total of 161 automation incidents were retrieved
- A little less than half of the reported incidents deal with automation dependency
- A total of 34 incidents saw a malfunction in one of the automated systems in the aircraft
- Incidents placed in the ATC category typically were non-aircraft related incidents
- 12 total incidents were due to lack of training, and lack of familiarity with either the aircraft or automation.



### Pilot Quotes Admitting Automation Dependency

- Automation Dependency was the clear stand out. Since ASRS is a self-reporting database, the number of automation dependency incidents is assumed to be much higher.
- Below are direct excerpts from pilots admitting they rely too much on automation in the cockpit:

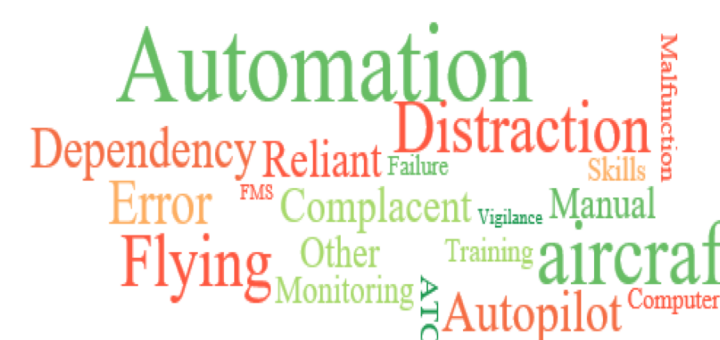
*“First, I relied too much on automation, rather than taking over and flying the aircraft”*

*“I could have monitored the automation better and not be seen so Automation Dependent”*

*“However, I should have noticed that I was climbing and corrected the problem, a perfect example of too much dependence on automation”*

### Word Cloud

Below is a word cloud depicting the most common words utilized in the incident reports:



- The most common words used by pilots included automation, dependency, distraction, autopilot, and complacent.
- Pilots are admitting to reliance, distraction, and complacency in the cockpit of airplanes.

## CONCLUSIONS

### Two Major Findings of the Study

1. The data shows that over the last 11 years, Automation Dependency has been a problem in Part 91 Operations.
2. The Pilot Quotes confirm that they are willing to admit they rely too heavily on automation.

### Recommendations

1. Continued training on manual flying skills and conducting situational training on how to deal with automation malfunctions will be even more necessary to ensure aircraft safety in the future.
2. Notify aviation schools about the need for more training in manual flying to ensure complacency in automation is not an issue

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This is a snapshot of ASRS Database. To begin the search, the user must click on start search and begin to enter the specific search criteria