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SAFETYWIRE

History: 5 Plane Crashes That Prompted Widespread Aviation Safety Reforms

(Source: Rytis Beresnevicius; Simple Flying, April 20, 2024)

Air travel has been one of the safest forms of transportation for a number of years. However, the industry has had to learn many lessons to get to the point where it is now, many of which were harsh and written in the blood of those who have passed away during the numerous accidents over the years.

1. TWA Flight TWA800

Date of the crash: July 17th, 1996

- Aircraft involved in the accident: Boeing 747-100
- Main changes following the publication of the final report: Fuel tank safety

In July 1996, a Trans World Airlines (TWA) Boeing 747-100 departed New York John F. Kennedy International Airport (JFK), operating flight TWA800 to Paris Charles De Gaulle International Airport (CDG). However, shortly after takeoff, the aircraft disintegrated mid-air, crashing into the Atlantic Ocean just off the coast of the United States.

In its final report, the National Transportation Board (NTSB) concluded that the center wing fuel tank exploded, issuing three recommendations to improve the safety of fuel tanks. As a result, the FAA issued a final rule titled 'Transport Airplane Fuel Tank System Design Review, Flammability Reduction, and Maintenance and Inspection Requirements.'

6021 South Syracuse Way
Suite 301
Greenwood Village, CO 80111
+1 513.852.5110
+1 800.361.2216
argus.sales@argus.aero

The rule resulted in new airworthiness and maintenance standards for commercial aircraft, requiring type certificate (TC) and supplemental TC (STC) holders to prove their fuel systems can prevent ignition sources inside the tanks. As a result, numerous airworthiness directives (AD) followed, including a recently proposed rule change addressing the safety of the Boeing 747-400F.

Photo: **Kambui | Wikimedia Commons**

2. Germanwings Flight 4U9525

Date of the crash: March 24th, 2015

- Aircraft involved in the accident: Airbus A320
- Main changes following the publication of the final report: Two people in the cockpit at all times, new mental health rules

On March 24th, 2015, a Germanwings Airbus A320, registered as D-AIPX, was flying between Barcelona El Prat Airport (BCN) and Dusseldorf Airport (DUS). In the middle of the flight, with the first officer locking himself up in the cockpit, the pilot deliberately crashed the Airbus A320 into the French Alps.

6021 South Syracuse Way
Suite 301
Greenwood Village, CO 80111
+1 513.852.5110
+1 800.361.2216
argus.sales@argus.aero

Photo: **aeroprints | Wikimedia Commons**

The French Bureau of Enquiry and Analysis for Civil Aviation Safety (Bureau d'Enquêtes et d'Analyses pour la sécurité de l'aviation civile, BEA) noted that in December 2014, the pilot began showing "*symptoms that could be consistent with a psychotic depressive episode*," consulting several doctors afterward. However, he never contacted any Aero-Medical Examiners (AME), with the BEA later concluding that was one of the contributing factors of the accident, as the pilot was afraid of losing his job.

In total, BEA, as the leading investigative authority of the incident, provided 11 safety recommendations to numerous stakeholders, including aviation regulators within Europe. Still, pilots' mental health has remained a taboo topic, with authorities, including the FAA, attempting to address the issue to this day.

6021 South Syracuse Way
Suite 301
Greenwood Village, CO 80111

+1 513.852.5110
+1 800.361.2216

argus.sales@argus.aero

3. Lion Air flight JT610 and Ethiopian Airlines flight ET302

Dates of the crashes: October 29th, 2018, and March 10th, 2019

- Aircraft involved in the accident: two Boeing 737 MAX 8
- Main changes following the publication of the final report: Aircraft Certification, Safety, and Accountability Act (ACSAA)

Photo: Markus Mainka | Shutterstock

While there were a number of changes that happened to Boeing and the 737 MAX, including the company changing its second chief executive officer (CEO) in less than five years, the two crashes' final reports culminated in the US government passing the Aircraft Certification, Safety, and Accountability Act (ACSAA).

According to the US Congress, the bill introduced at least eight changes to the FAA's processes, including mandating the introduction of safety management systems (SMS) at US-based aircraft manufacturers, requiring plane makers to disclose safety-critical information to the FAA, comprehensive review of the Organization Designation Authorization (ODA) holder's capability to meet regulations, and others.

6021 South Syracuse Way
Suite 301
Greenwood Village, CO 80111
+1 513.852.5110
+1 800.361.2216
argus.sales@argus.aero

4. KLM Flight KLM4805 and Pan Am Flight PA1736

Date of the crash: March 27th, 1977

- Aircraft involved in the accident: Boeing 747-100, Boeing 747-200
- Main changes following the publication of the final report: Cockpit and air traffic control (ATC) procedural changes

To this day, the Tenerife North–Ciudad de La Laguna Airport (TFN) disaster is the deadliest commercial aviation accident that happened, with two airlines' aircraft being involved in the event: a KLM Boeing 747-200 and a Pan Am Boeing 747-100. While neither of them was scheduled to land at TFN, a bomb exploding forced these two, and many other aircraft, to divert away from Gran Canaria Airport (LPA) on that day.

Photo: annasf83 | Shutterstock

Many things went wrong on that day. Nevertheless, what resulted from the crash, where out of the 644 people onboard on both 747s, only 61 survived, were fundamental changes in how communication is carried out in aviation, namely between the flight crews and air traffic control (ATC), as well as inside the cockpit.

6021 South Syracuse Way
Suite 301
Greenwood Village, CO 80111
+1 513.852.5110
+1 800.361.2216
argus.sales@argus.aero

5. United Airlines Flight UA173

Date of the crash: December 28, 1978

- Aircraft involved in the accident: McDonnell Douglas DC-8
- Main changes following the publication of the final report: Crew resource management/cockpit resource management (CRM)

In December 1978, a United Airlines McDonnell Douglas DC-8, flying between JFK and Portland International Airport (PDX), with a stop at the now-defunct Stapleton International Airport (DEN), crashed after it ran out of fuel as the pilots were diagnosing a potential landing gear issue. The NTSB concluded that the probable cause of the incident was the failure of the captain to properly monitor his instruments, including low fuel warnings, while he also ignored other crew members' comments about the amount of fuel remaining, resulting in fuel exhaustion of the four engines.

Photo: **Clint Groves | Wikimedia Commons**

“Contributing to the accident was the failure of the other two flight crewmembers either to fully comprehend the criticality of the fuel state or to successfully communicate their concern to the captain.”

As a result, the NTSB issued three recommendations to the FAA, one that recommended the regulator to issue *"an operations bulletin to all air carrier operations inspectors directing them to urge their assigned operators to ensure that their flight crews are indoctrinated in principles of flight deck resource management."* Essentially, the recommendation resulted in the current cockpit processes, known as crew resource management/cockpit resource management (CRM), being present in cockpits globally.

6021 South Syracuse Way
Suite 301
Greenwood Village, CO 80111
+1 513.852.5110
+1 800.361.2216
argus.sales@argus.aero

For the Birds

(Source: Jim Tise; FAA, April 17, 2024)

When you're looking out an airplane window, you're supposed to see wings. You know, the metallic kind that helps lift the aircraft into the air. But what you don't want to see are the feathered kind. In that case, the FAA must cry fowl.

Birds have posed a threat to pilots since the dawn of aviation. As air travel has increased, so has the chance of colliding with birds. The "Miracle on the Hudson" accident is just one such example.

This year, the number of reported bird strikes is expected to reach an all-time high — about 17,500. So, the FAA, in partnership with the U.S. Department of Agriculture (USDA), is studying how drones might be used to keep birds away from airplanes when they are taking off and landing.

Testing will begin at Atlantic City International Airport in New Jersey by the end of this year. The FAA hopes to have an analysis of the testing and recommendations on the future use of drones to ward off bird strikes by the end of 2025.

"We're doing all this for the safety of the flying public," said Wesley Major, an airport research specialist for the FAA. "Wildlife are always present around airports. We're always looking at emerging tools and technology that will benefit the flying public's safety."

The drones can be flown at targeted species to disperse them when traditional airport wildlife mitigation measures are inadequate. They can also be used to surveil in and around the airport looking for burrows, nests/roosts, and other areas that are hard to access by foot or vehicle.

The FAA is applying bird/habitat research gathered at off-airport locations by the USDA and Mississippi State University to its latest testing regimen at Atlantic City.

6021 South Syracuse Way
Suite 301
Greenwood Village, CO 80111
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+1 800.361.2216
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“Habitat, food and mating are the main drivers that attract species to a given area,” explained Major. “We need to limit those attractants in the airport environment.”

Atlantic City offers an excellent testing environment: It is home to the FAA’s William J. Hughes Technical Center, which is overseeing the FAA’s bird strike research. The USDA has a full-time presence on their airfield and has performed data-gathering there in the past. More importantly, Atlantic City is a favored habitat for turkey vultures, a large fowl that can cause a lot of damage if they collide with airplanes.

“We want to make the habitat around Atlantic City Airport less attractive to this species,” Major said. “There’s a lot of green space for them to go in New Jersey. We just don’t want them around the airport.”

The USDA’s certified pilots will launch drones throughout all four seasons, during daytime and nighttime, at different altitudes and in variable weather conditions. The agency will coordinate all testing with the FAA and Atlantic City Airport and will monitor air traffic control frequencies to ensure the drones remain clear of approach and departure paths.

The USDA will operate the drone, an Autel EVO II quadcopter, on flights of up to 400 feet in altitude. Other drones will be used on an as-needed basis.

“We get the best response from quadcopters,” said Major. “These quads are the most nimble and can take off and land almost anywhere.”

Drones could potentially supplement existing wildlife-mitigation methods. These include cap gun-style firearms that emit flares and noise — aka “bangers and screamers” — using sound cannons to disperse birds and removing the elements of habitat that attract fowl in the first place.

“We’re looking at where wildlife is, what tools are at an airport’s disposal to ward them off, and which are most effective,” Major said. “A drone may not be the first tool at their disposal, but it will give you that extra reach that you may need.”

6021 South Syracuse Way
Suite 301
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+1 800.361.2216
argus.sales@argus.aero

SAFETY MANAGER'S CORNER

Ground Risk Analysis Tool

Just about everyone is familiar with the flight risk analysis tool, or FRAT, but many of you might not be aware of its sibling for ground and maintenance activities. It's something we call the GRAT, which obviously substitutes the word "ground" for the word "flight" in the acronym. Applying FRAT like concepts to aircraft maintenance activities might make sense for your operation.

Although very similar in concept, significant differences do exist between the GRAT and FRAT. While a FRAT evaluates the cumulative risk for a single flight, the GRAT encompasses risks expected for maintenance actions during a specific period of time. Typically this can be thought of as a work shift, comprised of a variety of planned and unanticipated tasks will be acted upon.

Specific risk factors contained in a GRAT should always be driven by the specific operating characteristics of a flight operation. Typical risk categories might include human factors, environmental factors, facility factors, and the type of task or anticipated activity. The risk categories are comprised of individual risk factors and an associated risk point value for each. While any one single risk factor (or typically even a few grouped together) does not create excess risk, a compilation of certain factors would. Envision the following scenario: forecast weather of snow and frozen precipitation, a work schedule that runs until 2200 local time, an employee who will be working alone in the hangar from 1800 until 2200, that same employee has a 30 mile commute home, and the scheduled work involves the use of ladders inside the hangar. Considering any one of these risk factors probably does not present a cause for concern but grouped together the risk picture begins to elevate. How distracted might that employee become? Faced with a long commute in the dark and dealing with winter road conditions, loss of concentration while on the job would be completely understandable. Human factors exist because employees are human and not rote machines; we hurry when stressed, or inadvertently miss the obvious when distracted. A maintenance technician performing tasks while on ladder, working alone and with concerns weighing on his mind has the unfortunate potential for injury or worse.

How does the GRAT help in this scenario? It's often misunderstood that the GRAT would "tie manager's hands" by disallowing actions in scenarios like the above, thus preventing the accomplishment of normal tasks. That is not all the purpose of the GRAT, and in this scenario a simple risk control like a bi-hourly check-in phone call from the employee to a manager might reduce the existing risk to an acceptable level. That phone call could provide the manager with the opportunity to re-direct tasks or even send the employee home if the situation dictates.

A tool like the GRAT may not work for every type of aviation operation but it's definitely worthy of consideration.

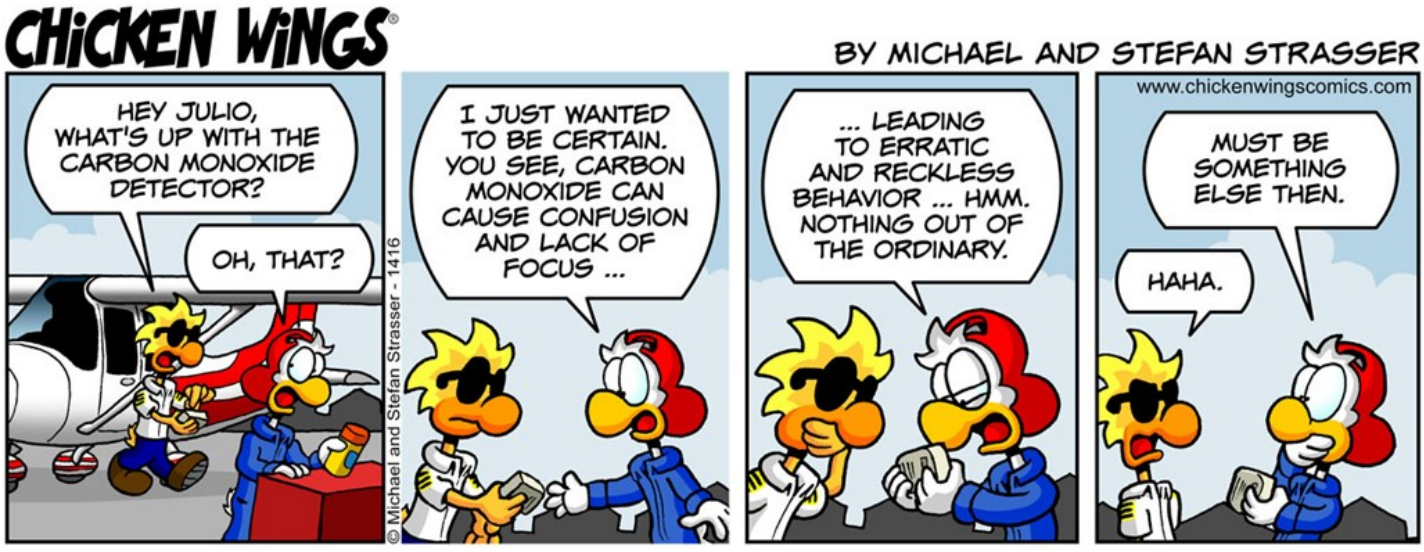
6021 South Syracuse Way
Suite 301
Greenwood Village, CO 80111
+1 513.852.5110
+1 800.361.2216
argus.sales@argus.aero

Quote of the Month

“Well done is better than well said.”

— Benjamin Franklin

Actions speak louder than words. The proof is in the pudding. No shortage of clichés exist describing the powerful effect of positive personal actions. Knowing what to do and then doing it right should never be taken for granted; preparation and dedication are necessary ingredients in the recipe of success. These commitments must come from not only individuals alone but from the collective organization as well. You see, it’s the organization that provides the context, the operating environment that so heavily influences individual behavior. We all know how difficult it is to swim against the tide of culture, for good or bad. That’s why the organization’s systems and culture are so important; they pull individuals along, hopefully in the right direction. Let your actions be a well done model, and contribute positively in those areas where the organization’s systems require improvement or proactive participation. Following the advice of the first great American thinker is an excellent “well done.”



6021 South Syracuse Way
Suite 301
Greenwood Village, CO 80111

+1 513.852.5110
+1 800.361.2216

argus.sales@argus.aero

CONTACT LIST

Susan Cadwallader
susan.cadwallader@prism.aero
VP,SMS Services

Jenna Albrecht
Jenna.albrecht@prism.aero
Program Manager, SMS Services

Wayne Ehlke
Wayne.Ehlke@prism.aero
Safety Analyst, SMS Services

ARGUS PRISM
A member of the SGS Group

6021 S. Syracuse Way, Ste 302
Greenwood Village, CO 80111
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+1 513.852.5110
+1 800.361.2216
argus.sales@argus.aero