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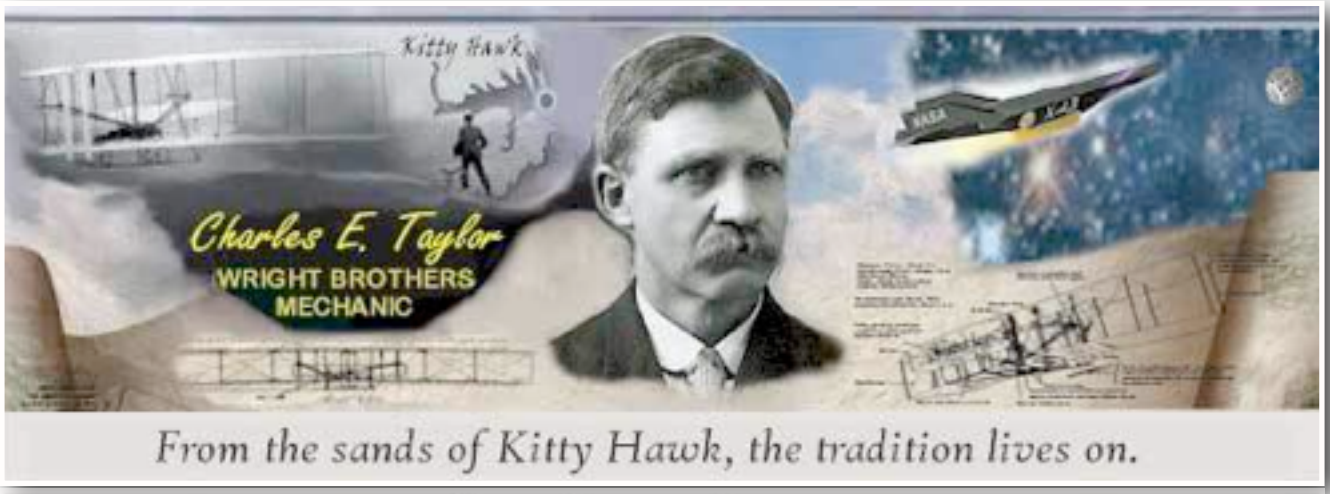


Hello all,
To subscribe send an email to: rhughes@humanfactorsedu.com
In this weeks edition of *Aviation Human Factors Industry News* you will read the following stories:

Ground Worker Killed Towing Boeing 777

Kuwait Airways has announced with regret that at 15:10 on Monday 6th May, one of its ground staff was killed at Kuwait International Airport. A spokesperson for the carrier revealed details of the tragedy in a tweet.
According to the airline, the member of the ground team was performing a routine tractor tow when the incident occurred.
According to Aviation Safety Network the worker had been tasked with towing a Boeing 777-300ER from a parking zone to Terminal 4.

Arriving at the terminal, the tractor's tow bar broke loose. Due to the taxiway's slight gradient the aircraft began to roll. The driver was crushed beneath the nose wheels of the aircraft.

Kuwaiti authorities have begun their own investigation into the accident.

Towing accidents

Towing aircraft is dangerous. Poor processes, loss of concentration and lax regulations can result in injuries, death, and damage to aircraft. It remains to be seen what caused the Kuwait crew death.

Several tug incidents are reported by Skybrary, a flight operations and traffic management source.

In 2017 a tug driver and other ground crew at Dublin International airport narrowly escaped injury when the tug's tow pin broke. The tractor lost control and collided with the right engine of the A320 it was towing.

An investigation discovered that the combination of a taxiway slope and early engine start contributed to the failure of the tow bar.

In 2008 a Ryanair B738 jet initiated a cross-bleed engine start prior to the conclusion of a difficult push-back in bad weather at Stansted. The aircraft rolled forward causing the tow pin to disengage. The plane's left engine struck the tow truck side-on.

In 2007 the crew of a BAe Jetstream initiated a push-back without communicating with ground staff at Birmingham International. Confusion led to an attempt by the tow truck operator to return the plane to the gate. The plane's brakes were engaged and the force of the truck's pull caused the nose wheel to collapse.

An update on the exact cause of the Kuwait crew death will no doubt be made public in the coming days.

"The FAA Taxi Test" on Livestream

Watch APT's "The FAA Taxi Test" on Livestream.com.
Don't get caught in the Crosshairs of a Runway Incursion!
Al Gorthy from the FAA Central Region Runway Safety Office will present a live interactive program to help keep us out of the runway crosshairs of danger.
This is a new video on FAA.gov that helps prevent runway incursions. Its interactive and a lot of fun.

https://livestream.com/FAASTeamTV/events/2185859

Trust Without the Verify

During our fall patrol in March 2019, I was assigned to the early return crew from USS Ronald Regan (CVN 76). We were sent to catch our 10 F/A-18E Super Hornets as they returned to our homeport at NAF Atsugi, Japan.I was informed by the maintenance master chief (MMCPO) that one of our returning aircraft would land with inflight refueling (IFR) probe issues. Conferring with the electrician, we decided to read out the wiring once the jet landed. After hours of troubleshooting, we came to the conclusion that the wiring must be good and the problem must be mechanical.

We explained the situation to the MMCPO, and he decided to replace the probe from another aircraft. After replacing the probe, we performed an operational check and still found the IFR probe with problems. Over the next several days, we poured through our manuals and changed multiple parts with no progress being made. The problem was put aside for the weekend to be taken back up once the entire squadron would be at work.

First day back from the break, I explained to my leading petty petty officer officer (LPO) what had been done so far in an attempt to correct the problem. Letting him take over the job, he walked over to the electricians to speak with their LPO. After examining the situation, the two first classes decided to open the wire harness bundle to check for broken wires. There was indeed a broken wire, and the discrepancy was repaired in short order. Once the operational check was complete, I signed inspector on the work order only confirming the parts were put back together (not physically looking, just taking the word of another inspector).

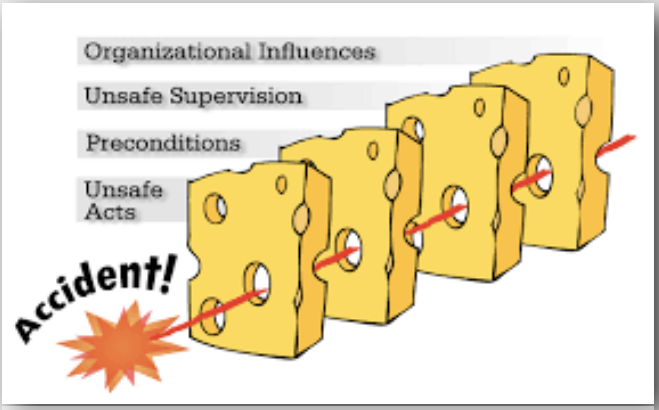
Two months later during our post deployment material condition inspection (MCI), one of the inspectors was inspecting the IFR probe bay area and found a missing cotter key on one of the linkages that was disconnected during the repair.

This led to a quality assurance investigation on all personnel involved in the maintenance and statements were written. The results of the investigation found that I was at fault for not only signing inspector, but because I signed without personally ensuring the work was completed correctly. This led to my qualifications being suspended for 90 days, extra military instruction (EMI), and holding training about the responsibilities and duties of a collateral duty inspector inspector (CDI).

I failed in my duties as a CDI by not doing the final inspection of the aircraft prior to signing as inspector on the work order. The potential for mishap is a constant in naval aviation and there is an increased risk when people fail to follow standard procedures.

I am beyond grateful that nothing serious happened with our aircraft or aircrew. I will work harder to train junior sailors and future inspectors not to make the same mistakes I did. Always perform that final inspection rather than trusting another person's word. We have all heard the old saying, "Trust but verify." Keeping that quote in mind could prevent you from making the same mistake.

Airplanes Crash for a Reason



Business is booming for air safety investigators around the world. Following a period of relative calm in 2017, the safest year on record for passenger airlines, there has now been a steady uptick in both accidents and fatalities. In fact, according to statistics collected by the Air Safety Network, the number of accidents since the end of 2017 is now above the five-year average. Two Boeing 737-8 Max accidents since October 2018 have not helped; collectively, these events have accounted for the loss of 346 lives.

So, why do airplanes crash? There are some usual suspects such as “gravity beats lift” or “drag defeats thrust,” but to really determine cause, investigators subscribe to an accident-causation model. Personally, I like James Reason’s Swiss cheese model of accident causation since it is a useful tool to explain very complex events.

However, the first step is to view each event with a wide lens and understand, as aviation safety researcher Sydney Dekker suggests, that “accidents are not accidents at all, but a failure in risk management.” To become even more open-minded, think of them as a “failure in imagination”—that’s how the 9/11 Commission report described the deep institutional failures associated with the 2001 terrorist attacks.

Reason’s Swiss cheese model gained popularity because “it illustrates that although many layers of defense lie between hazards and accidents, there are flaws in each layer that, if aligned, can allow the accident to occur.” By taking this approach, Reason’s model explores both active and latent failures and the four failure domains: organizational influences, supervision, preconditions, and specific acts. This model is a good way to look deeper into the human, technological, or organizational aspects of an accident.

Focusing on the information released to date from the two 737-8 Max accidents, let’s explore some of the latent and active failures. Latent failures are those that lie dormant for weeks, months, or even years. These failures are waiting for an opportunity. Active failures involve unsafe acts that can be directly linked to an accident.

Understand that this exercise is to demonstrate the complexities of determining cause and is not intended to speculate on the actual cause of either accident, which will come out in the final reports from the respective investigative bodies.

The 737 Max accidents are wrought with latent failures. Organizational influences involve the manufacturer, regulator, and/or operator—in some cases a combination of two or more. As an example, the requirement to achieve a common type-rating is driven by an airline's desire to cut training costs.

Aircraft manufacturers (all of them) want to sell airplanes, so to satisfy the needs of the customer the 737 Max has a common type-rating and requires minimal differences training—by video or bulletin, not in the simulator.

And as aircraft become more complex and automated, the philosophy from OEMs has shifted over the years to provide less-detailed information in training materials. As an example, during my Boeing 727 training, the systems course would "build" each system. In contrast, during my 747-400 training, the systems portion was more related to "operating" each system.

Other organizational influences identified focus on the regulator. In this case, the FAA's organization designation authorization (ODA) program has been harshly criticized by lawmakers. During a Senate aviation subcommittee hearing in March, Senator Richard Blumenthal questioned "the system that led to outsourcing safety" to the manufacturers and added, "The fact is that the FAA decided to do safety on the cheap and put the fox in charge of the hen house." Not exactly, and this is a bit of irony.

The origins of this "outsourcing" are based on past FAA reauthorizations that required an expansion of the ODA program due to a lack of appropriated funding. FAA Administrator Dan Elwell, in defense of the program, stated that to cover all the functions of ODA, the agency would have to add 10,000 employees at a cost of $1.8 billion.

Another latent failure identified in the Ethiopian Airlines accident was a low-time first officer flying a complex aircraft; this would be classified as unsafe supervision. Even though the first officer was current and qualified to fly in the Ethiopian "system," 200 hours of total flight time is not enough, especially when things go wrong.

The cognitive skills, crew interactions, and situational awareness required to handle complex emergencies are developed over time. In the U.S., the unsafe combination of those was highlighted during the Colgan Flight 3407 accident, and the ATP/1,500-hour rule was enacted to protect the traveling public.

In the case of the 737 Max accidents, much has been written about the maneuvering characteristics augmentation system (MCAS)—the system that "misfired" during each event. It's intentional that MCAS has not been mentioned until now.

MCAS version 1.0 with its single point of failure (one bad AOA sensor input) is considered another latent failure—all it would take to become active is a failed or bad sensor to make the system go haywire. In retrospect, it doesn't take a lot of imagination to see how the design of this system could go bad.

As described, these latent failures—most with strong organizational influences and many with economic ties—were brewing in the background for decades. All it took was an active failure of a poorly designed system to start a chain of events that would find each hole in the Swiss cheese model. MCAS and the 737 Max simply exposed several latent failures that were—and still are—present in the system.

*Pilot, safety expert, consultant, and aviation journalist Kipp Lau writes about flight safety and airmanship for **AIN**. He can be reached by email.*

How The Recent Aeroflot Disaster Echoes the 737 Max Crashes

An Aeroflot passenger jet burst into flames during an emergency landing at Moscow's Sheremetyevo airport yesterday, resulting in a conflagration that left 41 of 78 people aboard the plane dead. The plane, a Sukhoi Superjet SSJ100 as Aeroflot Flight 1492, had taken off at 6:03 p.m. local time bound for the Arctic Ocean port of Murmansk.

Approximately five minutes after takeoff, the pilot began a spiraling descent to return to the runway. Amateur video footage of the landing shows the plane bouncing several times before flames erupt in the tail of the aircraft. A video shot by a passenger from inside the plane shows flames engulfing the wings as panic set in inside the cabin.

While the plane was not a Boeing and did not involve a control system like the one implicated in the recent crashes of Lionair Flight 610 and Ethiopian Airlines Flight 302, the overall circumstances eerily echo the conditions that led to the loss of the two 737 Max jets. In all three cases, pilots suffered a dangerous and unexpected emergency during takeoff, lost the automation that they were used to relying on, and lacked the necessary skills to adequately handle the ensuing crisis. As such, these crashes illustrate the dangers of poorly integrating human and automatic control, a problem that will only worsen as automation becomes more ubiquitous.

While confirmed details of the Aerofloat crash remain sparse, reporting so far indicates that the plane was flying near thunderclouds at an altitude of 10,000 feet when it was struck by lightning. This caused numerous electronic malfunctions, including intermittent failure of the radio. Unable to declare Mayday verbally, the flight crew switched the aircraft's transponder — a device that causes the plane to show up on air-traffic control radar screens with identifying information — to transmit a code for "radio failure," and then for "emergency." The pilot executed an emergency descent, completing one and a half turns before lining up for final approach to the runway it had taken off from 28 minutes before, according to data provided by Flightradar24.

According to statements by the flight's pilot, Denis Evdokimov, published in the Russian newspaper *Komsomolskaya Pravda*, the plane's electrical problems resulted not only in the autopilot shutting off, but in the plane's fly-by-wire control system shifting from "normal law" (a mode in which pilots are prevented from putting the plane into a dangerous condition such as an aerodynamic stall) into "direct law" (which offers no protections).

Evdokimov thus had to fly under challenging conditions: under stress, in bad weather, and in a plane that was experiencing numerous equipment failures — notably, without the autopilot systems that pilots normally manage as they fly the approach route into a busy international airport. To make matters worse, the plane was fully laden with fuel, meaning that it was much heavier than normal. Often planes returning to land with a full fuel load will dump fuel or burn it off before attempting to touch down, but Evdokimov did not perform this procedure, perhaps out of a sense of urgency to get the plane back on the ground.

As reported in *Komsomolskaya Pravda*, Evdokimov claimed that on final approach "the speed was low for landing, normal" and that the plane "approached the ground smoothly, with a decrease in vertical speed." The fact that the plane bounced several times indicates that it was going too fast: excess speed causes a plane's wings to generate more lift than is desired, so the plane rises back into the air after touching down. If a pilot fails to handle the controls smoothly, the plane can then "porpoise" in a series of hops that can become increasingly severe. "The plane was jumping up and down like a grasshopper," passenger Peter Egorov told *Komsomolskay Pravda*. As the oscillations worsen, they can result in the tail or an underslung engine striking the ground. When a ruptured fuel tank or fuel line meets with a shredded red-hot engine, a conflagration can easily result.

Because nothing in Egorov's account suggests that the plane had suffered damage that limited its ability to land safely, investigators will likely pay particularly close attention to "human factors" — the psychological limitations that can turn an aircraft incident deadly. Under conditions of extreme stress, such as a lightning strike that causes a cascade of electrical malfunctions, the human brain experiences a phenomenon called "cognitive tunneling" that makes it hard to deal with a crisis creatively. As I write in my book, *Extreme Fear: The Science of Your Mind in Danger*, a person on the verge of panic is unable to process new information or come up with creative solutions. Only very well-learned habits can be performed easily. That's why experienced pilots like "Sully" Sullenberger can pull off miracles on the Hudson, while more junior pilots can fumble a survivable crisis.

Unfortunately, while the increasing use of automation in aviation has made flying safer overall, the fact that autopilots do most of the flying these days means than human pilots spend relatively little time controlling a plane by hand, leaving them ill-equipped to take the controls in a dangerous and unfamiliar situation. “A constant theme of mine is that designers of electronic systems on airplanes assume that if something goes wrong, pilots will calmly take over,” says aviation journalist and aircraft designer Peter Garrison. “That’s not what happens. The first reaction is bafflement.” Among other recent high-profile crashes in which this dynamic played a role were Air France 447, which crashed into the Atlantic en route from Rio de Janeiro to Paris in 2009, and Air Asia 8501, which crashed into the Java Sea in 2014.

One solution to the problem would be to make sure that pilots have more training and more flight experience. That’s not the direction the world is moving, however. Global air traffic has surged in recent years, especially in the developing world, creating an acute shortage of veteran pilots. For plane makers, the challenge will be to make planes that can be flown safely by less-qualified pilots, but that also won’t dump those pilots into tough-to-handle crises when the systems malfunction.

https://www.amazon.com/Extreme-Fear-Science-Danger-MacSci/dp/0230614396/ref=sr_1_2?keywords=extreme+fear&qid=1557151468&s=books&sr=1-2&ascsubtag=%5B%5Din%5Bp%5Dcjvcrly5e00hntqyeo1y0u1xi%5Bi%5DlDmA8D%5Bd%5DD%5Bz%5Dm%5Bt%5Dw%5Br%5Dgoogle.com

Leave your baggage behind

Carry-on baggage might well be one of the greatest examples there is of human greed and selfishness in action. And no, not just for the way your fellow airline passengers bend or break every rule to stuff as many things as they can in the overhead bins as they avoid airline fees for checked baggage.

There's a far more serious side to it, especially when an aircraft emergency takes place.Maybe it's human nature to want to hang onto your property, but it's a potentially fatal choice — for you, and for those around you.

After an air crash in Halifax in 2015 and an aircraft collision and fire in Toronto in 2018, the Transportation Safety Board warned that passengers insisting on taking their carry-on baggage with them in emergencies slowed escape and threatened lives.

This is from the report on the January 2018 collision in Toronto: "During the evacuation, the (flight attendants) issued instructions with and without the assistance of a handheld megaphone, telling the passengers to leave all their carry-on baggage behind. Despite these instructions, numerous passengers brought carry-on baggage with them, which slowed down the evacuation process."

As the Transportation Safety Board wrote in a report on its investigation of the Halifax crash, "If passengers retrieve or attempt to retrieve their carry-on baggage during an evacuation, they are putting themselves and other passengers at a greater risk of injury or death."

The aircraft burst into flames upon landing, a horrifying scene caught on camera. In different videos, you can actually see passengers fleeing with their carry-on bags in hand.

That happened despite the fact that it was a violent crash; parts of the aircraft were torn off, and metal support beams were pushed up through the floor of the aircraft into the passenger compartment.

The TSB sounds like a bit of a broken record on the issue. “In 2007, following its investigation into the August 2005 overrun occurrence at Toronto Lester B. Pearson International Airport, Ontario, the TSB found that, during the emergency evacuation of the aircraft, many passengers took their carry-on baggage with them, despite specific instructions to the contrary being repeatedly shouted to them by the flight attendants.”

Anyone sensing a theme here?

Turns out, the regulator was far too accurate. Almost prescient, in fact.

Because carry-on baggage apparently played a role in 41 deaths, including two children, in a fiery Moscow crash.

On Sunday, a Russian passenger jet headed from Moscow to Murmansk turned back after declaring an in-flight emergency.

The aircraft burst into flames upon landing, a horrifying scene caught on camera. In different videos, you can actually see passengers fleeing with their carry-on bags in hand.

As Reuters news agency reported, “The Interfax news agency cited an unnamed ‘informed source’ as saying the evacuation of the plane had been delayed by some passengers insisting on collecting their hand luggage first.”

Imagine: someone’s need to rescue their roller-suitcase could mean that other people die.

Human greed and selfishness, indeed.

Commercial Passenger Airplane Crashes Fast Facts

Here's a look at commercial passenger airplane crashes. For crashes caused by military acts or by terrorism, see Terrorism and War-Related Airplane Crashes Fast Facts.

On August 12, 1985, the largest number of deaths in a single commercial airplane crash occurred when a Japan Air Lines Boeing 747 crashed into Mt. Ogura in Japan, killing 520 passengers and crew members.

The deadliest commercial airplane accident occurred on March 27, 1977, when two Boeing 747s collided on a runway on the Spanish island of Tenerife, killing 583.

Timeline:

December 14, 1920 – Believed to be one of the first known commercial passenger airplane crashes, a British Handley Page HP-16 en route to Paris from London crashes just after takeoff, killing four of the eight people onboard.

March 3, 1974 – 346 people are killed when a Turkish Airlines DC-10 crashes in France, as a result of the cargo door not being fully latched.

March 27, 1977 – A KLM Royal Dutch Airlines Boeing 747 crashes into a Pan American World Airways Boeing 747 at the Los Rodeos Airport at Tenerife in the Canary Islands, killing a total of 583 (335 fatalities on the Pan American airplane and all 234 passengers plus 14 crew members on the KLM plane). The accident occurs when the KLM airplane begins its takeoff while the Pan American airplane is still on the runway.

May 25, 1979 – An American Airlines DC-10 crashes after takeoff from Chicago O'Hare International Airport, killing 271 onboard and another two on the ground. During takeoff, an engine on the left wing falls off; the FAA later faults American Airlines maintenance techniques for the crash.

November 28, 1979 – An Air New Zealand DC-10 crashes into Mt. Erebus in Antarctica and 257 people are killed. The crash is believed to be the result of a navigational error.

August 19, 1980 – Shortly after takeoff, a Saudi Arabian Airlines Lockheed L-1011 initiates a return to Riyadh International Airport due to a fire in the aft cargo compartment. The pilot lands the plane safely and continues to a taxiway. All 301 passengers and crew members perish in the fire before an evacuation is initiated.

August 12, 1985 – The largest number of deaths in a single commercial airplane crash occurs when a Japan Air Lines Boeing 747 crashes into Mt. Ogura in Japan, killing 520 passengers and crew members.

April 28, 1988 – An Aloha Airlines Boeing 737 decompresses, causing an in-air explosion. The pilot manages to land the plane safely, but one person is killed and dozens of passengers and crew members are injured. Later, the NTSB faults the airline's maintenance program for failing to address signs of metal fatigue and disbonding which ultimately caused the fuselage separation. The Aviation Safety Research Act of 1988 is passed by Congress as a result of this incident.

May 26, 1991 – Fifteen minutes after takeoff, a thrust reverser deploys on Lauda Air Boeing 767 Flight 004. The plane crashes 70 miles northwest of Bangkok, Thailand. All 223 passengers and crew are killed.

July 11, 1991 – The landing gear of a Nigeria Airways DC-8 catches on fire shortly after takeoff and upon return to the airport in Jeddah, Saudi Arabia, the plane crashes, killing all 261 people onboard.

April 26, 1994 – A China Airlines Airbus A300 crashes on approach to Nagoya Airport, Japan, and 264 people are killed

July 17, 1996 – TWA Flight 800, a Boeing 747, explodes in air and crashes off the coast of Long Island, New York. All 230 people aboard are killed. The NTSB rules the explosion was caused by faulty wiring that ignited a center fuel tank.

November 12, 1996 – A midair collision between a Saudi Arabian Airlines 747 and a Kazakhstan Airlines II-76 takes place at the New Delhi, India airport. All 349 people on both airplanes are killed.

August 6, 1997 – A Korean Airlines Boeing 747 crashes in the Guam jungle and 228 people are killed.

September 26, 1997 – A Garuda Indonesia Airlines Airbus A300 crashes in Buah Nabar, Indonesia, killing 234 people.

February 16, 1998 – China Airlines' Flight 676 from Indonesia to Taiwan requests another landing approach at Taipei International Airport. In the process of turning around, the aircraft crashes into a neighborhood, killing 203 people, including seven on the ground.

September 2, 1998 – A Swissair MD-11 crashes off Nova Scotia, Canada, killing 229. The Canadian Transportation Safety Board later concludes that flammable material and faulty wiring generated a fire that spread beyond the crew's control.

October 31, 1999 – EgyptAir Flight 990, bound for Cairo from New York, crashes into the Atlantic Ocean off the coast of Nantucket, Massachusetts, plunging 14,000 feet in 36 seconds. All 203 passengers and 14 crew members are killed. The US National Transportation Safety Board determines the crash was the result of the co-pilot's actions, but is unable to pinpoint why. It is widely believed the co-pilot deliberately caused the crash, but Egyptian authorities dispute this and reject the NTSB findings.

July 25, 2000 – The Air France Concorde, en route to New York, crashes into a Paris hotel shortly after takeoff, killing 113 (all 109 aboard and four on the ground).

November 12, 2001 – An American Airlines Airbus A300 crashes in Belle Harbor, Queens, shortly after takeoff from JFK Airport, killing a total of 265 people, including five people on the ground.

May 25, 2002 – A China Airlines Boeing 747 crashes into the Taiwan Strait 20 minutes after takeoff, killing all 225 on board. The crash is later attributed to metal fatigue brought on by a previous faulty repair job

January 15, 2009 – US Airways Flight 1549 lands in the Hudson River in New York City approximately three minutes after takeoff, and after hitting a flock of birds. All 155 aboard survive. The flight's pilot, Chesley B. "Sully" Sullenberger, emerged as a hero, with praise being heaped on him by passengers, officials and aviation experts.

June 1, 2009 – Air France Flight 447 from Rio de Janeiro to Paris carrying 228 passengers and crew is lost over the Atlantic. The first bodies are recovered on June 6, approximately 600 miles off the northern coast of Brazil. On July 5, 2012, France's Bureau of Investigation and Analysis releases a report concluding that a series of errors by pilots and a failure to react effectively to technical problems led to the crash of Air France Flight 447.

March 8, 2014 – Malaysia Airlines Flight 370 disappears from radar after taking off from Kuala Lumpur en route to Beijing. After more than 10 months of searching for the plane, on January 29, 2015, the government of Malaysia officially declares the loss of MH370 an accident and all passengers and crew, 239 people in total, are presumed dead. On July 30, 2018, while announcing the release of a safety investigation report, Malaysian authorities say they have failed to determine the cause of the plane's disappearance, while ruling out several possibilities.

March 24, 2015 – Germanwings Flight 9525 crashes into the French Alps after taking off from Barcelona, Spain, en route to Dusseldorf, Germany. All 150 people on board are killed. On March 26, 2015, officials say that 27-year-old co-pilot Andreas Lubitz deliberately crashed the plane after locking the pilot out of the cockpit. A later investigation reveals that he had suffered from depression in the past.

March 10, 2019 – A Boeing 737 MAX 8 crashes in Ethiopia, killing all 157 people on aboard, marking the second time in less than six months that one of the planes has crashed within minutes of takeoff. Lion Air Boeing 737 Max 8 flight went down over the Java Sea last October, killing 189 people. Both crashes are under

investigation, and there is no evidence of a link between the two, but similarities between the incidents have prompted caution among some aviation authorities and airlines. On April 4, 2019, according to Boeing, a preliminary report on the Boeing 737 MAX 8 crash in Ethiopia "contains flight data recorder information indicating the airplane had an erroneous angle of attack sensor input that activated the Maneuvering Characteristics Augmentation System (MCAS) function during the flight, as it had during the Lion Air 610 flight."

First flight after restoration fatal for pilot

The accident flight was the Piper PA-12's first flight after undergoing restoration over the course of two years.

Although the mechanic who had worked on the airplane with the pilot wanted the pilot to do a high-speed taxi test before flight, the pilot wanted to "hurry up" and test fly the airplane as he had a friend visiting and wanted to take him flying in the airplane.

During the takeoff, witnesses observed the airplane pitch up into a nose-high attitude just after liftoff, stall, and descend in a nose-down attitude to hit the ground at the airport in Sanford, Florida. The pilot died in the crash.

Examination of the wreckage revealed crush damage to the nose and the leading edges of the wings that was consistent with a nearly vertical nose-down flight path at the time of impact.

Further examination of the wreckage revealed that the airplane's elevator control cables were misrigged, such that they were attached to the incorrect (opposite) locations on the upper and lower ends of the elevator control horn, resulting in a reversal of elevator control inputs. If the pilot had checked the elevator for correct motion during the preflight inspection and before takeoff check, he likely would have discovered that it was misrigged, and the accident would have been avoided.

Probable cause: The incorrect rigging of the elevator control cables, which resulted in a reversal of elevator control inputs applied by the pilot during the takeoff, an excessive nose-high pitch, and subsequent aerodynamic stall after takeoff. Also causal was the inadequate post-maintenance inspection and the pilot's inadequate preflight inspection and before takeoff check, which failed to detect the misrigging.

NTSB Identification: ERA17FA148

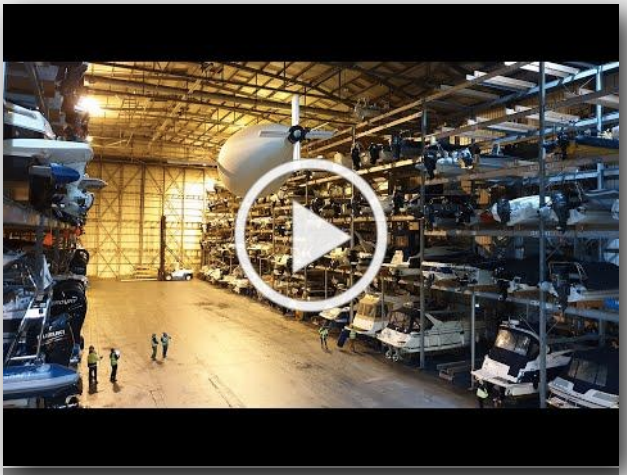
This April 2017 accident report is provided by the National Transportation Safety Board. Published as an educational tool, it is intended to help pilots learn from the misfortunes of others.

This Drone 'Breathes' Air To Propel Itself and Has Unlimited Range

With the rapid rate that drone technology is advancing, we shouldn't be surprised when increasingly complex UAVs hit the scene with fanfare. But the Phoenix, a new drone out of the United Kingdom, is a marvel-and could have major military implications.

At 49 feet long and 34 feet wide, the Phoenix looks like a small flying bomb with (relatively) tiny wings covered by solar panels, which makes it plenty imposing on the outside. But it also uses a "variable-buoyancy propulsion system" to move through the air.

As the Phoenix sucks in air and stores it within an inflatable bag, it becomes heavier and uses its wings to steer forward and into an altitude-losing dive. This provides forward movement. The Phoenix then releases the air, rising to altitude again. It also has a supply of helium, or alternately hydrogen, to provide increased buoyancy.



The drone essentially spends half of its airborne time as a lighter-than-air vehicle, and the other half as a heavier-than-air aircraft. Since it lacks an internal combustion motor and the need for fuel, theoretically the Phoenix could stay aloft indefinitely and act as a floating sensor or communications node for military forces.

The aircraft's fuselage is constructed out of Vectran with wings made of carbon fiber, and it's so inexpensive that its designers-who come from several universities and small businesses in the U.K.-describe it as "near disposable."

The Phoenix, which has been in development for three years, would have a broad array of military uses. It could be used as a satellite alternative to provide line-of-sight secure communications, passing along signals across thousands of miles.

The aircraft could also serve as a persistent sensor platform, hovering over a trouble spot and using cameras or electronics to keep track of enemy movements and communications. And because it's so low-cost, armed services could keep plenty Phoenixes in reserve, deploying them in emergencies.

http://r20.rs6.net/tn.jsp?f=001Z4-0Hz7MsiI0OJ2nHDbfx5oqf25N0L0CJU1d0m4g598qbL1F5v1bRdpmFtdZY5cpmJSE3dBAL5GYDw_LwPgOqmBf5NPiwniDQictczNVxswkAdk3Xbs8690OmFcn96xJcR1zhkQ2l6ePNmKg271nJXHBMSkNhHVa41U_Q4_o2vvEzjzOR7u3ag==&c=YxekuH1b9nmt8b7Sl4shDzSrBDU9NA8uo7_p7nKXIGqrz0AxYYCyEg==&ch=d9P7cW3h4QK7BN0pLifB0cfpdAXWAOzclwemAZaCFkia7lPlM4EseQ==

Ted Talks: Ideas worth Spreading

Turbulence: one of the great unsolved mysteries of physics

You're on an airplane when you feel a sudden jolt. Outside your window nothing seems to be happening, yet the plane continues to rattle you and your fellow passengers as it passes through turbulent air in the atmosphere. What exactly is turbulence, and why does it happen? Tomás Chor dives into one of the prevailing mysteries of physics: the complex phenomenon of turbulence. [Directed by Biljana Labovic, narrated by Addison Anderson].

https://www.ted.com/talks/tomas_chor_turbulence_one_of_the_great_unsolved_mysteries_of_physics