Aviation Human Factors Industry News

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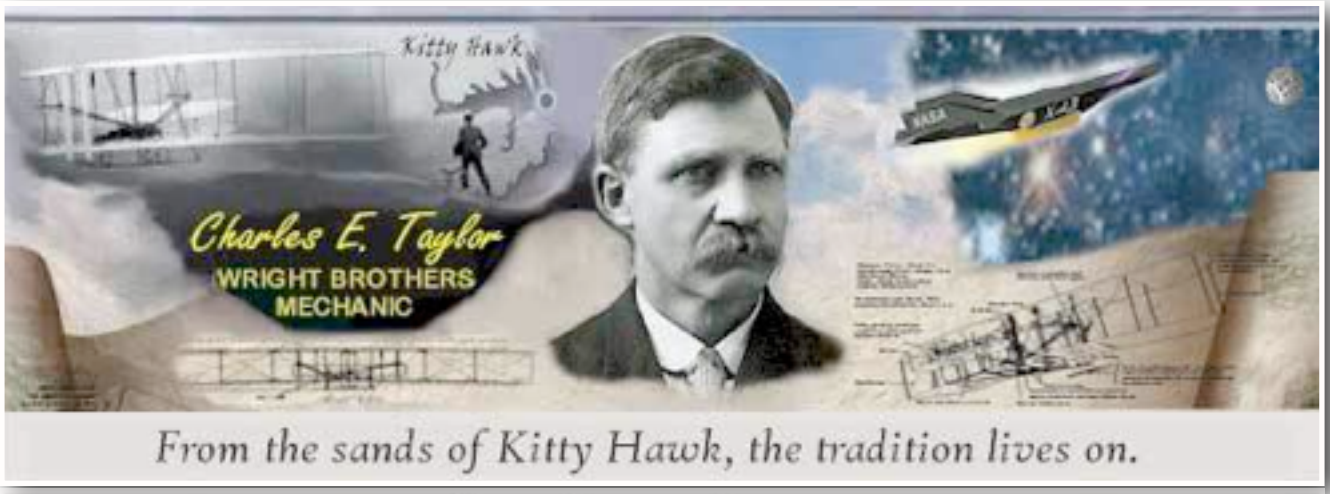


Hello all,

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:

The legacy of Flight 191

When an engine ripped off a DC-10 at O'Hare it killed 273 people, and changed air travel forever

https://graphics.chicagotribune.com/flight-191-anniversary/index.html

New details reported in investigation of disastrous Moscow airplane fire

The Sukhoi Superjet 100 airplane that caught fire upon landing at Moscow's Sheremetyevo Airport on May 5 did not accelerate during touchdown as previous reports had claimed, but it was carrying a 1.6-ton overload, presumably of fuel.

RIA Novosti journalists reported on multiple new developments in the investigation of the fire after reading a document prepared by Russia's federal aviation agency.The document also indicated that, contrary to ordinary procedures, the airplane's wing flaps were not extended during landing. Meanwhile, the pilot of the plane "actively toggled" the airplane's steering control, causing its nose to move up and down continuously.

New data regarding the handling of the fire onboard also came to light in the report. Fire alarms on the SSJ 100 turned on at 3:30:34 PM, four seconds before the airplane stopped. The plane's fire extinguishing systems turned on at 3:30:58, but its engines continued working for at least seven more seconds afterward, at which point the plane's engine tracking systems stopped recording.

Most Valued Insurance Policy Ever!

By Chris Thomas
Instructor Pilot, Prevailance Aerospace

The discussion of pilots' over reliance on automation is in the forefront of most aviation accident investigations. With more than 19,000 hours as a pilot and over 11,000 as a line check airman/line evaluator, I am disheartened with the concept that pilots are not effectively flying their aircraft, but I consistently see that reality.

I currently fly for a commercial airline, a formation aerobatic demonstration team and an upset prevention and recovery training (UPRT) safety academy. I can tell you that the latter continues to be the most effective training and separately, the most valued insurance policy available.

As pilots, we collectively fly billions of dollars' worth of aviation hardware and technology. We train to the highest level of automation for the aircraft that we fly, yet little time is spent with no automation or mixed levels of automation. Programs like the Advanced Qualification Program (AQP) and concepts like "train to proficiency" allow pilots to demonstrate competency in a simulator with no real-world external factors. After one or two iterations, these same pilots are deemed competent.

Training to Failure

On the contrary, consider a SEAL team or fire department where there is a paradigm of training to failure vice the aviation industry's train to proficiency. These elite teams degrade everything around them until each individual operates in the harshest, most degraded environment because in reality, they must be prepared for that eventuality.

Aviation trains to the lowest level of proficiency aligned with the most basic understanding of our automation. We know how to operate the avionics, but not what happens when the avionics do not function or are functioning in a degraded state. Pilots need to be proficient at every level of automation, including its absence.

It is very easy to get bogged down in the latest accident and subsequently train to address the latest anomaly. A more pragmatic approach is to focus on a firm understanding and practical experience with aerodynamics. This includes high pitch attitude considerations, hand flying and interpreting data vice watching data with the autopilot on. This means walking away from a training evolution with a better understanding and practical experience with adverse conditions and sub-optimal automation performance.

LOCI and Aviation Accidents

Whether I am in an airliner, T-6 or Extra 330, the industry best practices and SOPs align with the FAA Advisory Circular regarding Loss of Control Inflight (LOCI) to ensure the automation is disconnected, attitude and energy state are confirmed and that the wing(s) are not stalled. The actual mechanics vary by platform, but the laws of aerodynamics are universal.

LOCI continues to maintain the top spot as the leading cause of fatal accidents in aviation. The European Union Aviation Safety Agency (EASA) believes LOCI can result from inappropriate manual control inputs or poor automation management often leading to "automation surprises." 1) These "automation surprises" catapult pilots into the startle response and why it is so important to ensure pilots are comfortable in every aircraft attitude with a clear understanding of energy management.

Learning to Manage "Startle" Properly

The FAA continues to describe "startle" as a physiological response to unexpected situations that can cause an associated delay in initiating appropriate recovery action. Training and preparation can reduce startle response time and promote more effective and timely responses.

2) It is the startle that throws pilots off their game. Only by managing startle can pilots effectively recover an aircraft from LOCI. The question then becomes, when do you actually feel fear? Or the physiological fight or flight response? It is not in a simulator and it is not during discussions of possible emergencies in a briefing room. It is when something unexpected actually happens.

If you can manage your own startle response in a dynamic aircraft like those used for UPRT, then you can certainly manage it when required in the aircraft that you fly on a regular basis. The investment in UPRT is insignificant as compared to the benefits of managing pilot startle and being unafraid to remove the automation. For these reasons alone, UPRT is the most valued insurance policy to protect aviation assets.

Please see the video below with a UPRT instructor talking a student through a spin.

Startle Response, FAA, Retrieved on 4/25/19 from: https://www.faa.gov/news/safety_briefing/2017/media/SE_Topic_17_06.pdf

Loss of Control In-Flight in GA, EASA, Retrieved on 4/25/2019 from: https://www.easa.europa.eu/easa-and-you/general-aviation/flying-safely/loss-of-control

Otto's Pilots

A call for help from Washington, DC to Phoenix Air, based at a tiny airport in Cartersville, Georgia: Can you fly a medivac mission right away? The destination: North Korea. This is the first of a two-part episode on the extraordinary mission to rescue Otto Warmbier from North Korea.

LISTEN TO THE EPISODE

Crew Age, Experience Gap Cited In Taxiway Accident

India's Directorate General of Civil Aviation (DGCA) had some unusual crew resource management advice for Air India Express after a seasoned captain dumped a Boeing 737-800 in a drainage ditch at Cochin Airport in April of 2017 despite repeated warnings from his much younger female first officer.

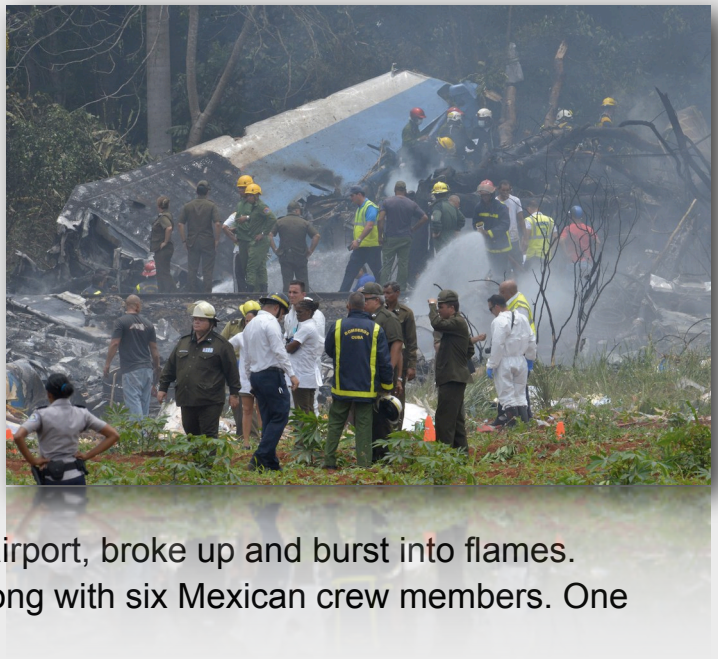
In its report, the DGCA tribunal said the airline shouldn't put old left seaters in the cockpit with young FOs. "Air India Express shall ensure proper crew pairing taking into consideration age factor, experience etc.," the DGCA said in its safety recommendations in the report. What the recommendations didn't say is that while the 28-year-old FO had only a fraction of the time the 59-year-old captain had, she had regularly flown into Cochin over the previous eight months while it was just the fifth trip there for the captain.

The captain was pilot flying when the aircraft touched down in heavy rain just after 11 p.m. The ground controller told the crew to take Taxiway Foxtrot to go to their gate. The FO told the captain she was having a hard time seeing the taxiway markings and signs. She recommended they call for a "follow me" vehicle to lead them to the gate. The captain pressed on and the FO told him when he'd passed Taxiway Echo and that Foxtrot was next. About 200 feet before Foxtrot, the captain turned left and put the Boeing into the concrete drain, collapsing the nosegear and coming to rest on its engines and tail with the mains hanging in the channel.

Despite the FO's pleas, the captain added power three times to try to bull out of the ditch but finally gave up. No one was hurt but the aircraft was heavily damaged. Cause of the crash was the "incorrect judgment of the PIC" in turning before the taxiway. It also said fatigue and poor visibility were contributing factors along with "disagreement of PIC with co-pilot for requesting 'Follow Me' jeep at Taxiway C."

http://www.dgca.nic.in/accident/reports/VT-AYB.pdf

Cuba: Crash of Global Air Boeing 737-200 at Havana due to errors in weight and balance calculations (18 May 2018)



The Instituto de la Aeronáutica Civil de Cuba (IACC) reported that it had completed their investigation into the May 2018 accident involving a Global Air Boeing 737-200, citing errors in weight an balance calculations.

The Global Air Boeing 737-200, operating on **Cubana de Aviación flight 972** from Havana to Holguín, Cuba, crashed shortly after takeoff on May 18. 2018. The aircraft came down in vegetation near a railway outside the airport, broke up and burst into flames. There were 107 passengers on board along with six Mexican crew members. One passenger survived the accident.

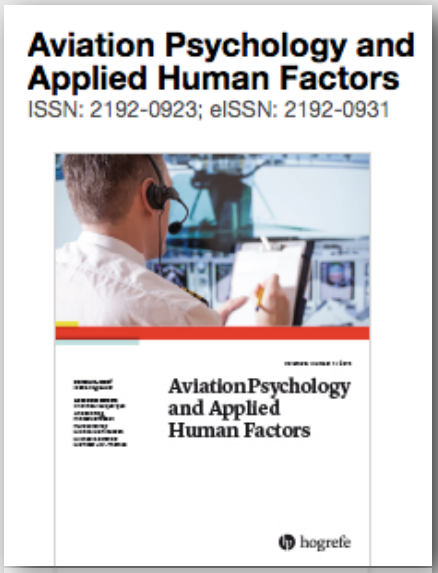
On May 16, the Instituto de la Aeronáutica Civil de Cuba (IACC) reported that it had completed their investigation. The authorities did not share any details and just reported that the probable cause of the accident "were the actions of the crew and their errors in the weight and balance calculations, which led to the loss of control and collapse of the aircraft during the takeoff stage"

A Global Air official earlier had reported that the aircraft had attained an extreme nose-up attitude during takeoff, which would suggest the centre of gravity was aft of the aircraft's limits.

Pilots with more flight hours have a greater internal locus of control, study finds

COGNITION

Professional pilots with more flight experience are less likely to believe that accidents are the result of circumstances outside of their control, according to new research in *Aviation Psychology and Applied Human Factors.*



"I've always been a bit of a nervous flyer myself, so the opportunity to empirically investigate a psychological factor related to aviation safety naturally appealed to me," said study author Hiten P. Dave, a PhD candidate at the University of Western Ontario.

"I got the offer to work on this paper from my current supervisor (Dr. Donald Saklofske) before I even started my PhD. A former graduate student of his (Dr. Alex Siegling) and one of his collaborators in Europe (Ms. Karina Mesarosova) had a large dataset with responses from European pilots."

"The construct of locus of control (LOC) refers to the degree to which life outcomes are perceived to be under one's own control (internal LOC) or due to an external, environmental factor (external LOC). In previous research, pilots with high internal LOC tended to also exhibit more safety-related behaviors (such as attending safety clinics), better risk perception, lower rate of accidents, and less job burnout," Dave explained.

The researchers were particularly interested in a psychological measure for locus of control called the Aviation Safety Locus of Control Scale (ASLOC), which was developed specifically for pilots by researcher David R. Hunter in 2002.

In the new study, the ASLOC was completed by a sample of 569 professional European pilots, who also reported their age and number of flight hours.

“We found that as pilots gain more flight experience, their internal LOC orientations tend to increase (after controlling for age),” Dave told PsyPost. In other words, pilots with more flight hours tended to agree more strongly with statements such as “If pilots follow all the rules and regulations, they can avoid many aviation accidents.”

“Linking this back to previous research, we can support the notion that as pilots gain more flight hours, they tend to take more responsibility for safety behaviors and thus are more likely to avoid aviation accidents. This is also consistent with another study by some of the collaborators who found that pilots tend to score higher on a measure of conscientiousness than a normative sample,” Dave said.

The researchers, however, have not yet directly assessed how locus of control influences pilots’ behavior and accidents. “The inferences regarding safety behaviors are based on previous research. It is our hope that future studies directly assess safety behaviors and accident involvement in relation to internal LOC,” Dave explained.

The researchers also used the results to validate the Aviation Safety Locus of Control Scale and statistically analyze how it was scored.

The scale originally split LOC into two separate factors: external and internal. But Dave and his colleagues “found a very large correlation between the two factors, and therefore suggest that the ASLOC scale should be a single-factor measure of internal LOC.”

“We found a strong correlation between internal and external LOC, whereas Hunter’s study found only a moderate correlation within the same measure.

While this could be due to differences in the nature of our samples, it would still be interesting to see if our finding replicates in future studies using this assessment scale. On the whole, however, we found that the ASLOC is a sound measure of LOC in pilots," he explained.

"I recently heard that we are due to receive another dataset with actual pilot performance data. We are all very excited to work on this project, which ought to build on the findings of this study. Stay tuned for that!"

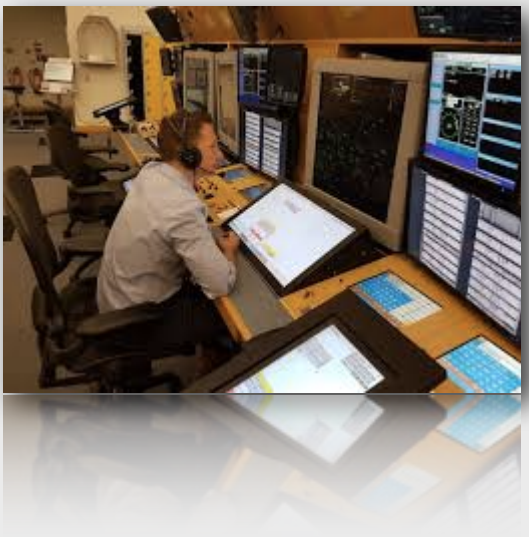
The study, "Assessing Locus of Control in Pilots: Psychometric Evaluation of a Self-Report Measure", was authored by Hiten P. Dave, Karina Mesarosova, Alex B. Siegling, Paul F. Tremblay, and Donald H. Saklofske.

https://psycnet.apa.org/record/2019-17181-004

Air traffic controller convictions draw criticism

Introduction

Air traffic controller and pilot organizations have criticized recent convictions handed down in Switzerland for operational incidents that resulted in neither injury nor damage.



Critics have asserted that criminal prosecutions in the aviation sector tend to do more harm than good and that the sole purpose of safety investigations following aviation incidents is to determine >

what went wrong in order to use this information to prevent similar incidents happening in future.

Most incidents involve some sort of human error and criminal prosecutions seek to determine who is responsible and punish them accordingly. However, this is contrary to the aims of safety investigations, including learning from past mistakes. There is widespread concern that criminalization leads to a loss of cooperation from individuals who could provide critical insight into an incident.

This article examines three recent convictions in this context.

Darwin Saab 2000/Sportcruiser incident

In March 2019 the Bulach District Court found an air traffic controller guilty of negligent disruption of public transport within the meaning of Article 237 of the Criminal Code.

This provision penalizes with a custodial sentence or a monetary penalty anyone who willfully or negligently endangers public transport – including air transport – and thereby "causes danger to the life and limb of other people". **(1)**

The conviction involved an August 2012 incident at Zurich airport between a Saab 2000 aircraft operated by Darwin Airline and a Sportcruiser-type aircraft that was engaged in flight training.

The controller, who worked for the Swiss air navigation services organization Skyguide, had cleared the Saab 2000 to take-off from Runway 28 while the Sportcruiser was on short final approach for a touch-and-go landing on Crossing Runway 16. To resolve the potentially critical situation, the Sportcruiser pilots turned away at low altitude. The two aircraft converged to a lateral distance of 205m and an altitude distance of 75 feet.

At the court hearing, the prosecution and the defence disagreed on whether the collision risk had been real or only hypothetical.

Two of the three judges found the prosecution persuasive. As a result, the controller was sentenced to a monetary penalty (the prosecution had asked for a prison sentence, to be suspended pending a probation period).

The defense appealed the judgment.

This conviction followed two convictions in April and December 2018 for similar operational incidents.

Swiss A320/Swiss A320 incident

Another earlier conviction concerned an incident of March 2011 – which also occurred at Zurich airport – involving two Airbus A320, each of which were operated by Swiss.

A Skyguide controller cleared the two aircraft to take-off from Crossing Runways 16 and 28. The controller issued the clearances in relatively quick succession. As the two A320 almost simultaneously approached the intersection, one crew aborted the take-off roll and brought their aircraft to a standstill on the runway. The other crew noticed nothing unusual and continued the flight to the destination.

In the subsequent criminal proceedings, the Bulach District Court acquitted the controller of the charges because the collision risk had been insufficiently high.

The prosecution appealed the judgment.

The High Court of the Canton of Zurich reversed. In November 2018 it ruled that the controller was guilty within the meaning of Article 237 of the Criminal Code. It reasoned that the air traffic controller's conduct had been in breach of relevant regulations and therefore negligent. According to the High Court, this had resulted in a real (ie, not only hypothetical) collision risk; as such, the controller was sentenced to a monetary penalty.

The defence appealed to the Supreme Court.

Ryanair B737/Air Portugal A319 incident

Another earlier conviction concerned the loss of the required separation between a Boeing B737, operated by Ryanair, and an Airbus A319, operated by Air Portugal, while en route under Skyguide's control in April 2013.

The crew of the Ryanair B737 requested a climb from flight level 360 to flight level 380 due to turbulence, but the crew did not add the call sign RYR 3595 to their request. The controller replied with the instruction to another Ryanair B737 bearing the call sign RYR 6DW to climb to flight level 380.

The crew of the first Ryanair B737 then responded with their own call sign RYR 3595 to the instruction to RYR 6DW and began to climb. Neither the controller nor the crew of RYR 6DW responded.

RYR 3995 came as close as 0.8 nautical miles horizontally and 650 feet vertically to the Air Portugal Airbus A319, which had been cruising on a crossing track on flight level 370.

As a result, the on-board traffic alert and collision system TCAS commanded RYR 3595 to descend and the Air Portugal A319 to climb. Both crews immediately followed their TCAS commands and resolved the conflict.

In May 2018 the Federal Criminal Court held that the controller had endangered the life of the passengers and crew of the Air Portugal A319 and the Ryanair B737 RYR 3959. The court found the controller guilty under Article 237 of the Criminal Code and sentenced him to a monetary penalty. The captain of the Ryanair B737 RYR 3959 was found guilty in separate proceedings.

The controller appealed to the Supreme Court.

Comment

All of these incidents involved serious operational mistakes on the part of air traffic control. But did these mistakes warrant criminal prosecution and conviction, particularly given that no one was injured and no damage occurred?

The three convictions concluded that a real collision risk had existed which led to a "danger to the life and limb of other people" within the meaning of Article 237 of the Criminal Code; however, this is problematic.

While Supreme Court case law provides little guidance as to what exactly is required to support such a conclusion in an aviation context, the authorities had made clear that there must be an actual collision risk and not a potential or hypothetical risk. In other words, only residual risk after avoiding action can be considered.

In all three cases, the pilots took avoiding action and quickly resolved a potentially dangerous situation. A realistic assessment should conclude that the residual risk thereafter remained within reasonable bounds.

The better view is therefore that no actual collision risk existed, but it remains to be seen how the Supreme Court and the Zurich High Court will decide in the cases under appeal.

However, as the three cases currently stand, they are testimony to a trend towards criminalization of aviation incidents and (even more so) accidents. This unfortunate trend may eventually obstruct the influx of safety-related information and, as a result, pose a real threat to aviation safety.

Rollercoaster Technique Could Have Helped 737 MAX Crews

An old-school technique tested by a U.S. flight crew in a 737 simulator might have helped the Lion Air and Ethiopian Airline crews had they known about it.

Colloquially referred to as the "roller coaster," the procedure requires the aircraft experiencing an out-of-trim condition to descend with reduced elevator input so that the horizontal stabilizer (used as pitch trim in the 737) could be "unloaded" enough to be manually adjusted. Then elevator inputs are resumed to arrest or slow the descent, and the procedure repeated until the aircraft is back in trim.

As reported by Aviation Week, the simulator crews set up the accident scenario from the Ethiopian Airlines flight and were able to demonstrate that despite following procedures in place after the Lion Air crash, they were unable to add enough nose-up trim manually without this special procedure.

“Keeping the aircraft level required significant aft-column pressure by the captain, and aerodynamic forces prevented the first officer from moving the trim wheel a full turn,” said the report.

After the Lion Air crash indicated that the MCAS was erroneously driving nose-down trim, Boeing recommended using the trim cutout switches to disable electric trim as part of the recovery procedure. Removing power from the electric trim also deactivated MCAS. Boeing did not, however, indicate that the flight crew might not be able to manually move the trim wheel. Based on these simulator runs, this appears to be a possible scenario: that the MAX was simply too far out of trim and going too fast for the crew to successfully re-trim with the manual wheel alone.

We do know that the Ethiopian crew used the electric trim to offset the initial MCAS inputs, but they apparently moved on to other troubleshooting avenues before getting the 737 MAX completely in trim. They described the trim system as “not working,” which is widely understood to mean the manual system. This supposition is backed up by the U.S. crew’s recent simulator experience.

According to the Aviation Week report, “Boeing’s assumption was that erroneous stabilizer nose-down inputs by MCAS, such as those experienced by both the [Lion Air] and ET302 [Ethiopian] crews, would be diagnosed as runaway stabilizer. The checklist to counter runaway stabilizer includes using the cutout switches to de-power the stabilizer trim motor. The ET302 crew followed this, but not until the aircraft was severely out of trim … Unable to move the stabilizer manually, the ET302 crew moved the cutout switches to power the stabilizer trim motors.” This step is contra-indicated by the checklist, in part because it would put MCAS back online.

As we’ve reported, changes expected with the MAX’s software are expected to eliminate the chance that MCAS will continue to offer corrections. The issue of revised simulator training to precede the MAX’s return to service is still being discussed.

In other MAX news, Ethiopian Airlines CEO Tewolde Gebremariam told NBC News on Monday that he’s unsure if his airline will fly the MAX again. "At this stage I cannot, I cannot fully say that the airplane will fly back on Ethiopian Airlines. It may, if we are fully convinced and if we are able to convince our pilots, if we are ever to convince our traveling public.

We have not got a time to discuss on the return to service and we have made it very clear on several occasions we would not be the first one to return their airplane back to air."

Human Factors and Ergonomics Society (HFES) Releases Policy Statement on Airline Seating

The Human Factors and Ergonomics Society (HFES) has released its policy statement on airline seating in response to Congress requiring FAA update standards for passenger seat dimensions. Specifically, the current FAA data regarding passengers' size and weight is outdated for today's travelers. In its policy statement, HFES outlines how the FAA's recommendations regarding adequate seat size can have a negative impact on passengers' health, safety, and comfort.

HFES offers four key areas for consideration: outdated standards resulting in poor fit, poor design contributing to bodily injury, implications of poor emergency evacuation standards, and health threats as they relate to limited space and movement. HFES cites the steady increase of airline passengers' dimensions as determined by the United States Army in 2014.

"As the average airline passenger's weight, height, and body continues to increase, the FAA and airlines must be cognizant on how outdated regulations can impact today's travelers' overall health and safety," stated HFES President Kermit Davis. According to Davis, "HFES and our members feel strongly that the >

airline industry should factor human characteristics and ergonomics into the design of their aircrafts."

With each parameter, HFES includes recommendations on ways the FAA should update its standards and guidelines in response to congressional direction. HFES looks forward to responding to an open and transparent process by FAA to solicit input that includes expert insight from the Society's experts.

To view the complete policy visit: https://higherlogicdownload.s3.amazonaws.com/HFES/42fffbb4-31e1-4e52-bda6-1393762cbfcd/UploadedImages/HFES_Statement_Airline_Seating_March_2019.pdf.

About the Human Factors and Ergonomics Society (HFES)

The Human Factors and Ergonomics Society, founded in 1957, is the world's largest scientific association for human factors/ergonomics professionals. HFES serves the needs of members and the public by promoting and advancing the discovery and exchange of knowledge concerning the characteristics of human beings that are applicable to the design of systems, products, tools, and environments of all kinds. For more information, visit www.hfes.org.

Insect in pitot tube causes accident

The private pilot stated that, during the flight, the airspeed indicator displayed a lower than normal airspeed. He landed the Mooney M20E at an intermediate airport to drop off a passenger, then continued to his home airport, a privately-owned, 2,000′ turf runway in Dowling, Michigan.During the first attempted landing, the airplane would not "settle," and the pilot initiated a go-around.

During the second landing, the airplane floated again, consistent with a higher-than-indicated airspeed, and he “forced” the airplane onto the runway.

The airplane porpoised and continued off the runway, hitting trees, a fence, and a pole, resulting in substantial damage.

During post accident examination, the remains of an insect were found in the pitot tube. A functional test of the airspeed indicator revealed no anomalies.

It is likely that the inaccurate airspeed indications were due to the contamination of the pitot static system, which subsequently resulted in a high approach and landing speed and subsequent runway overrun.

Probable cause: Inaccurate airspeed indications due to contamination of the pitot-static system with insect remains, which resulted in a high approach and landing speed and subsequent runway overrun.

NTSB Identification: CEN17LA184

This May 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.

These foods are keeping you awake at night

We all know to avoid caffeine for a good night’s sleep — but it’s not the only dietary z’s disrupter. Dr. Neomi Shah, an associate professor of sleep medicine at Mount Sinai, flags a few foods that could be keeping you up at night. Read ’em and sleep:

Spicy foods

Maybe skip the jalapeno poppers: Research suggests that hot foods "result in changes in sleep," Shah tells The Post. Meals containing lots of capsaicin — the compound that makes chili peppers so hot — can cause sleep-disrupting heartburn and indigestion. They can also mess with your internal body temperature, causing you to overheat at night.

Bad fats

If you're sleeping eight hours and still waking up groggy, you might want to trim the fat. A "cholesterol-rich diet," with fried foods, meat and dairy "is associated with nonrestorative sleep," says Shah. Swap those out for healthier fats instead. The Mediterranean diet, Shah notes, has been linked to fewer insomnia symptoms, with most of its fat coming from fish and nuts.

Simple starches

Don't be fooled by post-carb-binge sleepiness: High-glycemic-index foods, such as bread, potatoes and white rice "may increase your sleepiness" initially, says Shah. But they'll soon spike your blood sugar, leading to sleep disturbances. When you wake up from your carb nap, Shah says, "you may not feel as restored."

Juicy fruits & veggies

You wouldn't chug a big glass of water before bed — so don't eat watery foods, either. "If you're going to eat foods that induce diuresis," such as melon, cucumber or celery, "have that earlier in the day," says Shah. Otherwise, you'll wake up to nature calling.

Numerous nightcaps

Drinking might make you feel snoozy at first sip. But as with carb comas, the sleep booze brings isn't very restorative, says Shah. "We have enormous amounts of data that show it actually disrupts sleep . . . and reduces REM sleep." That means a groggier, unfocused morning — hangover or not.