

# Aviation Human Factors Industry News

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*From the sands of Kitty Hawk, the tradition lives on.*

Hello all,

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In this weeks edition of *Aviation Human Factors Industry News* you will read the following stories:

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How to get your team from “I have to do it” to “I want do it!”

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## National Safety Forum Examines Human Factors Behind Aviation Accidents

### Four-Hour Interactive Session Held On Final Day Of NBAA-BACE

For more than 40 years, investigators have cited [human error](#) as the root cause of nearly 75 percent of all aviation accidents. They are further confronted by errors that are often repeated, [and nearly always preventable](#). This disturbing reality, and the human elements behind those trends, were in focus at the fourth annual NBAA National Safety Forum held Oct. 18 at NBAA's Business Aviation Convention & Exhibition (NBAA-BACE) in Orlando, FL. The four-hour interactive forum offered the opportunity for business aviation operators to engage in candid discussions in a town hall format to drill down on how business aviation can be made safer. Sessions included a "back to basics" look at [complacency](#) and common operational errors; an examination of [human factors](#) issues from a physiological and psychological standpoint; and a comprehensive look at how leadership and professionalism can have a profound impact on safety.



NBAA Chairman Gen. Lloyd "Fig" Newton, who flew 269 combat missions in Vietnam and later with the U.S. Air Force "Thunderbirds" aerial demonstration team, began the event by recounting an early conversation with a higher-ranking pilot about the most important thing about flying.

Newton had confidently responded "safety," but the other pilot corrected him. "He said 'professionalism,' and of course that's true," Newton continued. ["If you have professionalism, then you have safety. And, we have to feel it in our soul and live it every day."](#)

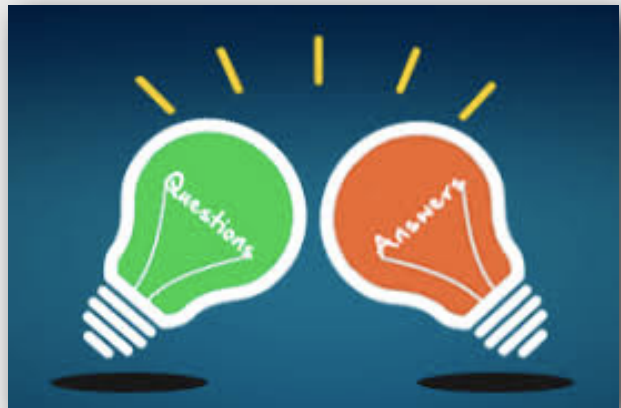
FAA Acting Executive Director of Accident Investigation and Prevention Steve Gottlieb further noted that [complacency](#), which may also be traced back to a lack of professionalism, is often the common denominator behind the most frequent causal factors of business aviation accidents.

"Investigators will tell you it often come down to [fatigue](#); [lack of respect for weather](#); [lack of performance planning](#); [lack of cockpit resource management](#); and [procedural non-compliance](#)," he explained. "These are the [persistent behavioral](#) attributes we see, and they're each readily addressable.

## **Commitment vs. Compliance: How to get your team from “I have to do it” to “I want do it!”**

As a aviation leader, how do you help each of your team members choose to be totally [committed vs. simply being compliant](#)—or worse yet, non-committal or ambivalent?

If you take a look at the Hierarchy of Commitment chart, a truly committed team member passionately says, “I will do it!” A compliant team member unenthusiastically says, “[I can do it if I am told to.](#)” And a non-compliant person says, “I will not do it.”



The difference between commitment and compliance is about your team being “all in!” [vs.](#) “simply going through the motions.”

It’s about achieving stellar results vs. just getting buy-in.

Think of it as taking on a quest for excellence as opposed to just meeting the minimum performance requirements. Unfortunately, there’s no magic bullet to motivate everyone to be committed. [It will take work and focus on your part.](#)

Let's examine some of the most **critical ingredients** to inspire your team members to perform in the “totally committed zone.”



### Create a “Culture of Commitment”

You likely realize that, as a high-performance leader, you must motivate the members of your organization to perform in their areas of responsibility. You can't do all the work yourself.

The inspiration to perform must come from within. To achieve that, you need to create a “culture of commitment.” This begins with letting your own personal values—your behavior and commitment—become a model for your team members. Remember, to be a leader, you must have followers and people won't choose to enthusiastically follow and commit to people who are disingenuous. In short, you must “walk the talk.”

To create a “culture of commitment,” you need to clearly establish the direction and objectives of the organization. And, to be truly effective, the direction and objectives must be inspirational—almost larger than life. They need to offer real meaning and purpose to the work of your team.

As a result, your team members will be able to see that their individual and collective contributions play key roles, and are vital to realizing the organization's vision and mission.

Of course, merely defining direction isn't nearly enough. You will also have to provide the requisite resources: budget, your time, political capital, coaching, etc. And, you must also offer your team the third key ingredient: the removal of obstacles and barriers to their performance.

### **Assess “Fit” vs. “Fitness”**

The engine of this “culture of commitment” is, of course, the people on your team. Here, the most important ingredients are “fit” and “fitness.”

Whether a person is the right fit for the organization can only be assessed, whereas fitness can be both assessed and developed. If the fit isn't there from the onset, don't kid yourself—it won't get better with time. The individual simply doesn't belong on your team. Be decisive, and make the call early and honestly.

Remember that the other members of your team will be assessing you based upon the skill you demonstrate in choosing highly capable and compatible team members.

You should expect that each one of your team members will require some level of development to enhance their fitness. However, your failure to confront poor performance is one of the lethal threats to your organization.

### **Design Individual Performance Plans**

Performance targets are always becoming more rigorous. Every team member will be expected to perform at higher and higher levels. Thus, designing and implementing Individual Development Plans (IDPs) is absolutely critical to the sustained success of the entire team. By investing in this effort, you'll be rewarded with your team members' commitment to you as their leader.



## **Inspire “Followership”**

The final element that will influence the powerful commitment of your team is your prowess as a leader. Focus upon these seven components of leadership and you will inspire “followership” from the team!

### **1. Know yourself**

Have the courage to take that pragmatic and honest look in the mirror. If you don’t truly know yourself, leading others will be virtually impossible.

### **2. Know each of your leadership team members**

When you align the passions and interests of your people with the goals and objectives of the organization, your toughest task will be to stay out of the way.

### **3. Know what’s going on**

Stay connected with your team members. When you are interacting with them on an individual or group basis, stay completely in that moment. Develop a laser-like focus that will block out all tangential thoughts or activities.

### **4. Develop your team**

Commit resources to help them develop their full potential. Commitment generates commitment.

### **5. Create a positive environment**

Fear and distrust shuts down human creativity and limits our ability to think beyond the “survival mode.”

### **6. Engage both your EQ and IQ**

To motivate superior, committed performance, you have to win your team members’ hearts and minds. The emotional quotient (EQ) of great leaders eclipses the intelligence quotient (IQ) every time. Your people must select you as their leader, an act that’s driven by their passions and interests and how they perceive them to be in synch with your own.

### **7. Trust**

It must flow both ways between you and the team. Without this critical element, making a big leap from compliance to being totally committed is simply impossible. So, there you have it. It certainly sounds simple and straightforward. But, in reality, it’s neither.

Leading an organization to perform consistently in the “totally committed zone” requires, at a minimum, [all of the elements highlighted above](#). You have to devote your total focus and commitment. The rewards of doing so, however, will be a highly aligned organization, functioning at peak performance levels. And, coincidentally, everyone will love what they are doing!

## **ROLLS-ROYCE ENGINE CLEANING PROCEDURES BLAMED FOR QANTAS A380 ENGINE EXPLOSION**

Australia's crash investigator has found that [faulty cleaning of fan blades](#) by Rolls-Royce resulted in an engine failure on a Qantas A380 on route to Melbourne.

The incident happened on May 20 last year about two hours after take-off as the crew initiated a climb to a higher flight level.

The Australian Transport Safety Bureau said that as the aircraft passed 32,500ft (FL 325), "the crew on the flight deck heard a loud bang and felt a sudden and unusual vibration of the aircraft."

Flight data showed that as the A380 passed FL 325, the No. 4 engine intermediate pressure turbine experienced an over speed and its N2 (Intermediate pressure shaft speed) increased from 92 percent to the red line limit of 98.5 percent over the next 2 seconds.

The crew were presented with various warnings and reduced the thrust on engine No. 4 to idle.



Then the engine fire warning message was displayed, which confirmed reports from the cabin.

The flight crew shut the engine down and pushed the engine No. 4 fire button and discharged one fire retardant agent.

The A380 was turned back to LA and landed without further incident.

Initial engineering inspection of the No. 4 engine following the incident found damage to the low-pressure turbine blades.

There was also minor damage to the right flap and flap fairing from debris exiting the rear of the engine.

Rolls-Royce, the manufacturer of the aircraft's Trent 900 engine, conducted an investigation into the engine failure that caused the shutdown and found that [the cleaning process caused corrosion to the low-pressure turbine stage 2 blades](#).

Rolls-oyce also maintains the engines for Qantas.

The ATSB said that "the corrosion led to [fatigue cracking](#) and subsequent release of blade shroud debris, resulting in significant downstream engine damage."

"The corrosion resulted from [chemical residue in the hollow blades from cleaning operations at the last service in July 2015](#)."

Rolls-Royce advised the ATSB that it found another 12 engines with blades potentially affected by the cleaning process.

As a result, the European Aviation Safety Agency released an Airworthiness Directive (AD), effective in June relating to the potential for blade corrosion due to residual cleaning contaminants



## Safety officials want faster reporting of aviation incidents

Safety officials say a near collision of airliners in San Francisco last year was a few feet from becoming [the worst crash in aviation history](#) and underscores the need for faster reporting of dangerous incidents before evidence is lost.



The National Transportation Safety Board issued a final report Thursday on the incident in which an Air Canada jet nearly crashed into planes lined up on the ground at San Francisco International Airport.

[The pilots were slow to report the incident to superiors.](#) By the time they did, the plane had made another flight and the cockpit voice recording of the close call was recorded over.

The NTSB says the recording could have helped investigators understand why the Air Canada pilots missed the runway and were [about to land on a taxiway](#) where four other planes were idling before they aborted their landing.

The Air Canada jet swooped to [just 60 feet above the ground](#) while passing over other planes packed with passengers waiting to take off shortly before midnight on July 7, 2017.

"Only a few feet of separation prevented this from possibly becoming the worst aviation accident in history," NTSB Vice Chairman Bruce Landsberg said in a statement accompanying the report.

Another board member, Earl Weener, said the Air Canada plane came within feet of hitting another plane and colliding with several others.

"Over 1,000 people were at imminent risk of serious injury or death," he said.

The deadliest aviation accident occurred in 1977, when two Boeing 747 jets collided on a runway in Tenerife on the Canary Islands, leaving 583 people dead.

The Air Canada captain, identified in NTSB documents as Dimitrios Kisses, was supposed to report the San Francisco incident to the airline as soon as possible but didn't because he was "very tired" and it was late. He waited until the next day. By that time, the plane was used for another flight, and the audio loop on the cockpit voice recorder was taped over.

The NTSB did not allege that Kisses and co-pilot Matthew Dampier deliberately delayed reporting the incident, but it did say that investigators could have gained a better understanding of what the crew was doing before the close call.

The NTSB is considering recommending that cockpit recorders capture the last 25 hours of flying time, up from two hours under current rules.

Board member Weener also criticized the airline industry's reliance on self-reporting of safety issues, saying the industry and the Federal Aviation Administration should consider stronger measures to intervene after a dangerous situation.

Weener noted that other pilots were alert enough to turn on lights to warn the off-course Air Canada jet. Yet once the danger passed, he said, they took no action to prompt "an intervention and evaluation of the Air Canada crew."

The five-member board determined last month that the incident was caused by the Air Canada pilots being confused because one of two parallel runways was closed that night. The closure was noted in a briefing to the pilots, and nine other planes had made routine landings after the runway was shut down.

The safety board also criticized the FAA for having just one controller on duty at the time of the incident, and recommended better lighting to tell pilots when a runway is closed at night.

"It is noteworthy that the NTSB's recommendations were not directed at Air Canada specifically and address many areas for improvement," said Air Canada spokesman Peter Fitzpatrick.

Air Canada told the NTSB it has taken steps to increase safety since the event, including emphasizing proper procedures for landing approaches and specific training to familiarize pilots with the San Francisco airport.

The NTSB recommended development of technology to better warn pilots and air traffic controllers when a plane appears to be off-course for a runway.

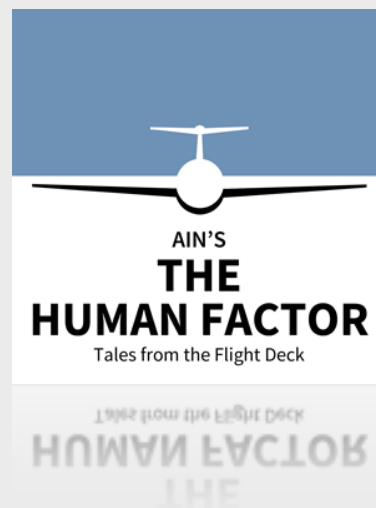
In their final report, the ATSB said the crew "[worked together well](#)" in using their checklists and with help from air traffic control.

## **Familiarity Breeds Complacency | AIN's Tales from the Flight Deck Podcast**

[Pilot complacency during preflight inspection](#) nearly led to disaster on a brisk October day in 2008. As an experienced flight crew readying for a short repositioning hop on that crystal clear morning neglected one simple, but crucial task, it soon placed them and their aircraft in danger. [What would lead veteran pilots to make such a novice mistake](#), and how can such similar errors be prevented?

**In this episode we will hear from:**

- Dan Boedigheimer, SIC
- Nick Duke, PIC
- Doug Downey, Convergent Performance
- Vanessa Shawver, Convergent Performance
- Jim Weaver, Advanced Aircrew Academy



### Topics this episode will cover:

- Pilot complacency
- Preflight checklist importance
- Ground icing

[https://www.ainonline.com/podcast/business-aviation/2018-10-15/episode-13-familiarity-breeds-complacency-ains-tales-flight-deck-podcast?\\_hsenc=p2ANqtz-\\_dThy57litCvI-HT13tb2vwpl7CPoXdzuiXMhMmnsR0zFmGmWNXO5oWVVmCArPHrLFwlqIUVP LC8AY7KOIYpMdNfhIq0vQBnZ-i0Umqo641sxnzhM&\\_hsmi=66573809](https://www.ainonline.com/podcast/business-aviation/2018-10-15/episode-13-familiarity-breeds-complacency-ains-tales-flight-deck-podcast?_hsenc=p2ANqtz-_dThy57litCvI-HT13tb2vwpl7CPoXdzuiXMhMmnsR0zFmGmWNXO5oWVVmCArPHrLFwlqIUVP LC8AY7KOIYpMdNfhIq0vQBnZ-i0Umqo641sxnzhM&_hsmi=66573809)

## **Calm crew averted disaster after propeller fell off plane, ATSB says**

The Australian Transport Safety Bureau has **praised the efforts** of an aircraft's crew for landing safely after a propeller sheared off mid-flight last year.

On March 17, a Regional Express flight from Albury carrying 16 passengers and three crew members was forced to make an emergency landing at Sydney Airport after one of the propellers flew off, **narrowly avoiding hitting the body or wing of the plane.**



The Saab 340 was about 102 kilometres south-west of Sydney Airport when the pilots noticed vibrations coming from the right engine.

They began the engine shutdown procedure, but the propeller sheared off, forcing the crew to issue a PAN PAN call - one step down from a Mayday emergency.

The plane landed safely about midday that day, and, four days later, the propeller was found in dense forest about 19 kilometres south-west of the airport.



At the time, aviation watchers said the pilots had "used all of their luck getting out of that situation".

"They were a hair's breadth away from a disaster. I don't know how the hell it didn't damage the aircraft as it went past," Australian Licensed Aircraft Engineers Association president Paul Cousin said.

"The crew did not make any rapid decisions, and ensured that all options were considered before action was taken, including consideration of the go-around requirements due to weather," the bureau said.

"These factors combined to contribute to a positive outcome for the aircraft."

The ATSB also recommended more checks of certain aircraft components to prevent similar incidents from occurring. The bureau found the propeller sheared off the engine mid-flight due to a fatigue crack in one of the shaft's components.

It also found the engine manufacturer's maintenance manual did not include instructions to inspect for fatigue cracking, and operator inspection sheets did not have space for recording any potential issues.

"Consequently, this may not have provided for the best opportunity to ensure potential defects were identified, recorded and monitored," the bureau said.

After the incident, the engine manufacturer sent out bulletins requiring immediate inspection of the propeller shaft.

Regional Express also immediately removed five other aircraft with the same propeller gearboxes and shafts from services so they could be examined.

The ATSB said the incident highlighted the fact that plane components such as the propeller shaft could develop defects and fail mid-flight, and [that good crew training provided](#) "the best opportunity for a positive outcome in the event of such a failure affecting flight safety".

<https://www.smh.com.au/link/follow-20170101-gv0i1c>

## **Video: NTSB warns pilots and mechanics about worn fuel selectors**

The National Transportation Safety Board has issued [two Aviation Safety Alerts](#) — one for pilots and one for mechanics — warning of fuel starvation and loss of engine power from worn fuel selectors. The safety alerts come after the NTSB investigated several recent accidents where worn fuel selectors contributed to the cause of the accident.





A companion video (below), featuring aircraft investigators discussing the safety issue, has been posted on the agency's YouTube Channel.

[https://generalaviationnews.com/2018/10/13/video-ntsb-warns-pilots-and-mechanics-about-worn-fuel-selectors/?utm\\_source=ActiveCampaign&utm\\_medium=email&utm\\_content=%5BThe+Pulse+of+Aviation%5D+Drone+Safety&utm\\_campaign=TPOA-20181015](https://generalaviationnews.com/2018/10/13/video-ntsb-warns-pilots-and-mechanics-about-worn-fuel-selectors/?utm_source=ActiveCampaign&utm_medium=email&utm_content=%5BThe+Pulse+of+Aviation%5D+Drone+Safety&utm_campaign=TPOA-20181015)

[https://www.nts.gov/safety/safety-alerts/Documents/SA\\_076.pdf](https://www.nts.gov/safety/safety-alerts/Documents/SA_076.pdf)

[https://www.nts.gov/safety/safety-alerts/Documents/SA\\_075.pdf](https://www.nts.gov/safety/safety-alerts/Documents/SA_075.pdf)

## **Technician Accidentally Sets off an F-16 Cannon, Blows Up Another F-16**

This sounds like something straight out of a goofy military comedy, but I assure you this is real: a Belgian technician **accidentally set off the cannon of a military plane during maintenance**, which shot another plane. That plane blew up, damaging the initial plane in the process. Talk about a bad day.



As reported by *Aviation24.be*, the event took place at the Florennes Air Base on October 11. A bunch of planes were being serviced, since some were heading off for a training mission. A technician in one of the F-16s accidentally **hit that metaphorical big red button and activated its six-barreled Vulcan M16A-1 cannon**.

Presumably before he even had time to utter “oh, shit”, another F-16AM had burst into flames. This one had recently been fully fueled for a training run, and yes, the bullets hit the gas tank. Oops!

And because the world is cruel, the blast from the exploding F-16AM also impacted the plane that delivered the shots.

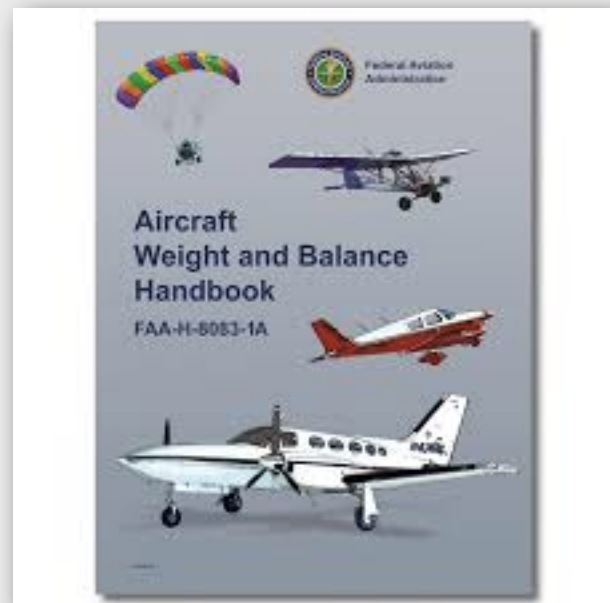
Unfortunately, two technicians were also injured during the blast. The full extent of their injuries isn’t known, but the Belgian Aviation Safety Directorate has opened an investigation to see what, exactly, they can do to make sure something like this doesn’t happen again, possibly with even worse results.

## **Overweight plane crashes on takeoff**

The airline transport pilot, who was the pilot flying, and a commercial pilot, who was the pilot not flying and was acting as a safety pilot and was not expected to know the airplane’s systems, limitations, or characteristics, were preparing to depart for a personal flight with eight passengers on board the Beech 100. When the pilot arrived at the airport in Jeffersonville, Indiana, he determined that the airplane had 900 pounds of fuel onboard. He instructed the lineman to fuel the airplane with 211 gallons of fuel (1,413.7 pounds) for a fuel total of 2,313.7 pounds.

The pilot reported **he was aware** that the total weight of the eight passengers, their bags, and the fuel caused the airplane to be **overweight**, but that he did not complete a weight and balance form or determine the expected takeoff performance before the flight.

He informed the other pilot that the flight would be heavy, but he did not tell him how much the airplane exceeded the airplane’s maximum gross takeoff weight.



After the accident, the pilot determined that the airplane was 623 pounds over the maximum gross takeoff weight.

The airplane's flight controls and engines were operating normally during the pre-takeoff check and that the elevator pitch trim was positioned in the "green" range.

The pilot taxied the airplane onto the runway and applied the brakes and increased the throttles to takeoff power before releasing the brakes for the takeoff roll.

However, he did not confirm the power settings that he applied when he advanced the throttles. The airplane did not accelerate as quickly as the pilot expected during the takeoff roll.

When the airplane was about halfway down the runway, the airspeed was 80 knots, so he continued the takeoff roll, but the plane was still not accelerating as expected. He stated that he heard the other pilot say "redline," so he decreased the power.

At this point, the plane had reached the last third of the runway, and the pilot pulled back on the control yoke to lift the airplane off the runway, but the stall warning sounded. He lowered the nose, but the airplane was near the end of the runway.

He added that he did not get "on" the brakes or put the propellers into reverse pitch and that the airplane then departed the runway.

The pilot veered the airplane right to avoid the instrument landing system antenna, which was 500' from the end of the 5,500' runway, but the left wing hit the antenna, the left main landing gear and nose gear collapsed, and both propellers contacted the ground. The airplane then skidded left before stopping about 680' from the end of the runway.

The evidence indicates that the pilot decided to depart knowing that the airplane was over its maximum gross takeoff weight and without determining the expected takeoff performance.

During the takeoff roll, he did not check his engine instruments to determine if he had applied full takeoff power, although the acceleration may have been sluggish because of the excess weight onboard.

The other pilot was not trained on the airplane and was not able to provide the pilot timely performance information during the takeoff.

Neither the pilot nor the other pilot called out for an aborted takeoff, and when they recognized the need to abort the takeoff, it was too late to avoid a runway excursion.

**Probable cause:** The pilot's inadequate preflight planning, his decision to take off knowing the airplane was over its gross takeoff weight, and his failure to abort the takeoff after he realized that the airplane was not accelerating as expected, which resulted in a runway excursion.

NTSB Identification: [CEN17LA029](#)

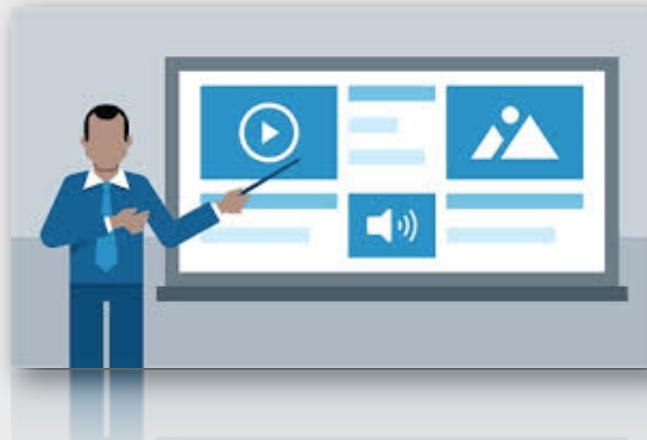
This October 2016 accident report is provided by the [National Transportation Safety Board](#). Published as an educational tool, it is intended to help pilots learn from the misfortunes of others.

## **FlightSafety and University of Southern California to Offer New Series of Courses for Maintenance Department Leaders**

FlightSafety International and the University of Southern California, Los Angeles campus, enter into an agreement to provide [a comprehensive series of courses for aircraft maintenance department managers](#).

"We are pleased to now offer our Customers a new series of Human Factors, Safety Management and Accident Investigation courses through the University of Southern California," said Steve Gross, Senior Vice President. "USC is known as the premier provider of aviation maintenance soft skill training." The courses include [Human Factors in Maintenance](#), [Human Factors in Aviation Safety](#), Aviation Safety Management Systems, Gas Turbine Accident Investigation, Helicopter Accident Investigation, Aircraft Accident Investigation, Safety Management for Aviation Maintenance, Safety Management for Ground Operations and Accident/Incident Response Preparedness.

They can be taken at the USC campus in Los Angeles [or onsite at the Customer's location](#). All these courses will be electives for the FlightSafety Master Technician-Management Program and can be taken under a FlightSafety Event-based agreement.



“The USC Aviation Safety and Security program was established at USC in 1952 as the first Aviation Safety program at a major research university. Since that day over 60 years ago, we have striven to develop and present the most advanced and relevant aviation safety courses available to all segments of the aviation community,” said Thomas Anthony, Director USC Aviation Safety and Security Program. “Our instructors are skilled educators with extensive industry experience. Because FlightSafety International and USC are both leaders in their respective aviation roles, we look forward to the dynamic synergy that will come from this partnership.”

## **70% of workers are tired on the job, NSC report shows**

Nearly 7 out of 10 workers feel tired on the job – [including many in the safety-sensitive industries](#) of construction, manufacturing, [transportation](#) and utilities – according to a new report from the National Safety Council.

[Fatigue](#) in Safety-Critical Industries: Impact, Risks and Recommendations, the last report in a three-part series, includes analysis of a 2017 NSC survey of employers and employees that found [69 percent of workers](#) in all industries experience workplace fatigue.

A large, three-dimensional, red graphic of the number '70%' with a percentage sign. The numbers are thick and have a slight shadow, giving them a 3D appearance. The background is white.

However, although 93 percent of employers consider fatigue a safety issue, only 72 percent of employees agree. Other results:

- 97 percent of employers in transportation say they feel the effects of fatigue, with 66 percent reporting losses in productivity and 45 percent experiencing fatigue-related safety incidents.
- 98 percent of employers in manufacturing agree that it is unsafe to drive drowsy, compared with 77 percent of employees in the industry.
- All construction employees report observing at least one risk factor of fatigue. Working a demanding job (77 percent) and working high-risk hours (46 percent) were most common.

“We’ve been looking at the impact of fatigue in the workplace for a long time, [but it is troubling to see just how affected our safety-sensitive industries are](#),” Emily Whitcomb, senior program manager of the fatigue initiative at NSC, said in a Sept. 25 press release. “[When you’re tired, you can be deadly](#), and these industries are already at higher risk because of their safety-sensitive jobs. We urge employers to address fatigue risk in their workplace so all employees can be healthy and safe.”

The first two reports in the series, as well as additional information on fatigue, can be found at [nsc.org/fatigue](https://nsc.org/fatigue).

[https://cdn2.hubspot.net/hubfs/278353/900014513%20Fatigue%20Survey%20Report%20FNL\\_Part%20Three%20WEB.pdf?t=1537891121542&utm\\_campaign=Fatigue&utm\\_source=hs\\_automation&utm\\_medium=email&utm\\_content=66116533&\\_hsenc=p2ANqtz-\\_IHuP0UEJLtu9qE-E0XRtPZHpwseaoJDb0wPFpKcrOBqhHt1ulmQgQNtAt0lps4Jz7BgkmnRr3VKiy8T9ZKf\\_XxUqSmw&\\_hsmi=66116533](https://cdn2.hubspot.net/hubfs/278353/900014513%20Fatigue%20Survey%20Report%20FNL_Part%20Three%20WEB.pdf?t=1537891121542&utm_campaign=Fatigue&utm_source=hs_automation&utm_medium=email&utm_content=66116533&_hsenc=p2ANqtz-_IHuP0UEJLtu9qE-E0XRtPZHpwseaoJDb0wPFpKcrOBqhHt1ulmQgQNtAt0lps4Jz7BgkmnRr3VKiy8T9ZKf_XxUqSmw&_hsmi=66116533)

<https://www.nsc.org/work-safety/safety-topics/fatigue>



## TED: Ideas Worth Sharing

Imagine being by yourself in the dead center of a 3,000-foot vertical cliff -- without a rope to catch you if you fall. For professional rock climber Alex Honnold, this dizzying scene marked the culmination of a decade-long dream. [In a hair-raising talk](#), he tells the story of how he summited Yosemite's El Capitan, completing one of the most dangerous free solo climbs ever.



[https://www.ted.com/talks/alex\\_honnold\\_how\\_i\\_climbed\\_a\\_3\\_000\\_foot\\_vertical\\_cliff\\_without\\_ropes#t-697387](https://www.ted.com/talks/alex_honnold_how_i_climbed_a_3_000_foot_vertical_cliff_without_ropes#t-697387)