

# 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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## Industry Fatigue Measure

The University of Illinois at Urbana Champaign has teamed with a Maintenance Fatigue Working Group to carry out a [maintenance industry fatigue benchmark study](#). The online survey, which takes about 15 minutes to complete, will be hosted at the University of Illinois to collect data on maintenance technician work practices and operational conditions related to work and duty patterns across the industry. This information is being collected as part of ongoing efforts that hope to inform future advisory and rulemaking efforts.

If your company is interested in participating in this free study which will be run May through June 2011, please contact Dr. Terry von Thaden at [vonthade@illinois.edu](mailto:vonthade@illinois.edu) to sign up. A copy of the aggregate data as it relates to your company will be provided to you at the end of the survey.



## Scientists: Controllers need naps on the job.

The [best solution](#) to the problem of sleepy air traffic controllers [is more sleeping on the job](#), scientists say.

But that would be a [radical change](#) for the Federal Aviation Administration. Current regulations forbid sleeping at work, [even during breaks](#). Controllers who are caught can be suspended or fired. Experts say that kind of thinking is outdated.

"There should be [sanctioned on-shift napping](#). That's the way to handle night shift work," said Gregory Belenky, a sleep expert at Washington State University in Spokane. There are plenty of other scientists in the U.S. and around the world who agree with him.



Sleep studies show that nighttime workers who are allowed ["recuperative breaks"](#) are more alert when they return to their tasks.

A working group on controller fatigue made up of officials from the FAA and the National Air Traffic Controllers Association, the union that represents controllers, recently embraced that position as well.

The issue has taken on a new urgency in the wake of four recent episodes in which the FAA says controllers fell asleep while on duty. The most recent case occurred when the pilot of a plane transporting a critically ill passenger was unable to raise the sole controller working at 2 a.m. in the tower of the Reno-Tahoe International Airport in Nevada.

The FAA said the controller was out of communication for 16 minutes. Controllers at a regional radar facility in California assisted the plane, which landed safely.

The episodes have sent administration officials scrambling to assure the public and angry members of Congress that air travel is indeed safe. Even President Barack Obama weighed in, telling ABC News in an interview, "We've got it under control," and warning controllers [they must stay alert](#) and do their jobs.

"The fact is when you're responsible for the lives and safety of people up in the air, you better do your job," he said in an interview Friday with "Good Morning America."

Republicans in the House want to cut FAA's budget by \$4 billion over the next 3½ years, but Transportation Secretary Ray LaHood said that won't prevent the agency from adding more controllers if that's what's necessary.

"We can't let money stand in the way of safety," he told NBC's "Today." "And we will work with Congress making sure we have the resources, we have the right number of controllers."

In fact, the FAA and the controllers union — with assistance from NASA and the Mitre Corp., among others — has come up with [12 recommendations for tackling sleep-inducing fatigue among controllers](#). Among those recommendations is that the FAA change its policies to give controllers on midnight shifts [as much as two hours to sleep plus a half-hour to wake up](#).

That would mark a profound change from current regulations that can make sleeping controllers subject to suspension or dismissal.

Yet, at most air traffic facilities, it's common for two controllers working together at night to engage in [unsanctioned sleeping swaps](#) whereby one controller works two jobs while the other controller naps and then they switch off, present and former controllers told The Associated Press. The controllers requested not to be named because they didn't want jeopardize their jobs or co-workers' jobs.

More than two decades ago, NASA scientists concluded that airline pilots were more alert and performed better during landings when they were allowed to take turns napping during the cruise phase of flights. The FAA chose to ignore recommendations that U.S. pilots be allowed "controlled napping." [But other countries, using NASA's research, have adopted such policies for their pilots.](#)

Several countries — including France, Germany, Canada and Australia — also [permit napping by controllers during breaks in their work shifts](#), said Peter Gimbrere, who heads the controllers association's fatigue mitigation effort. Germany even provides controllers [sleep rooms with cots](#), he said.

Sleep scientists long have known that [fatigue affects human behavior](#) much like alcohol, slowing reaction times and eroding judgment. People suffering from fatigue sometimes focus on a single task while ignoring other, more urgent needs.

One of the working group's findings was that the level of fatigue created by several of the shift schedules worked by 70 percent of the FAA's 15,700 controllers can have an impact on behavior equivalent to a blood-alcohol level of .04, Gimbrere said. That's half the legal driving limit of .08.

"There is a lot of [acute fatigue](#) in the controller work force," he said.

Controllers are often scheduled for a week of midnight shifts followed by a week of morning shifts and then a week swing shifts, a pattern that sleep scientists say interrupts the body's natural sleep cycles.

Another common schedule compresses five eight-hour work shifts as close together as possible while still allowing controllers eight hours off in between each shift. The advantage is that controllers then [get three days off](#) at the end. But the shift is known as the "rattler" because controllers say it doubles back and bites those who work it.

One recommendation by the working group would require at least nine hours off between shifts instead of the current eight. Another would allow controllers to [sleep during the 20-minute to 30-minute breaks they typically receive while working daytime shifts](#). Now, they can watch TV, play cards, have a snack — but not sleep.

The recommendations were presented to FAA Administrator Randy Babbitt in January. The agency is still reviewing them, FAA spokeswoman Laura Brown said.

But paying controllers who nap at work may be a tough sell in Congress. One influential lawmaker said building in time to sleep on the job is unacceptable.

"I think that is [totally bogus](#)," Rep. John Mica, R-Fla., chairman of the House Transportation and Infrastructure Committee, told the AP.

"There are so many professions that have to work long hours. I was greeted this morning by a young surgeon that had been working all night in an ER."

Bill Voss, president of the Flight Safety Foundation in Alexandria, Va., and a former air traffic controller, disagreed.

"It's not outrageous to have people in a safety job rest on duty," Voss said, citing ER doctors and firefighters who have similar practices.

"What is crazy," Voss said, "is putting two people onto a shift in a dark room with no noise and telling them to stare out a window and do nothing for eight hours, [but to never fall asleep](#)."

## **LaHood: No sleeping on the job**

Transportation Secretary Ray LaHood says it's up to air traffic controllers to ["get the right rest" and stay awake on the job](#). He tells CBS's "The Early Show" the [won't pay controllers to take naps](#) while on duty, but federal officials are open to other options to ensure aviation safety.



## **CBS NEWS**

## **Key workers falling asleep worries safety experts**

**Is it a troubling trend when people in critical positions fall asleep on the job?**

A deadly early-morning bus crash. A late-night silence from air traffic control. [Commercial pilots nodding off in the sky](#). Security guards caught [snoozing at a nuclear power plant](#). Transportation Security Administration agents catching 40 winks while on duty. They are not just isolated incidents of [employee fatigue](#) but arguably the sign of a troubling trend: people in critical positions falling asleep on the job, CBS News chief investigative correspondent Armen Keteyian reports.

"This is showing up in a lot of industries - not just the airline industry," said Dr. Lawrence Epstein, a sleep and safety expert.



"We're seeing it in truckers, we're seeing it in bus drivers and other mission-critical industries.

#### ["Air traffic controller admits to sleeping on job"](#)

A CBS News review found five government reports from recent years highlighting the dangers of key employees nodding off while at work, like a massive 2004 train crash in Texas that killed three and released poisonous gas into the air. Investigators found "the engineer and conductor were likely asleep at the controls," identifying "employee fatigue as a significant factor in many train accidents."

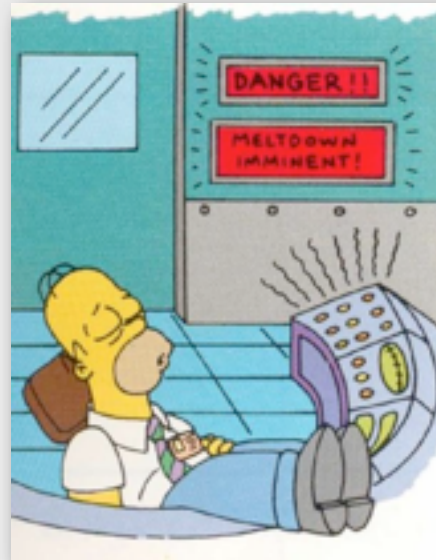
#### [Air traffic chief resigns after series of lapses](#)

CBS News discovered a post from last June into the Federal Aviation Safety Database by an anonymous pilot who wrote "more than half the pilots I fly with inadvertently fall asleep during flight at least one time per day."

Overall, the National Transportation Safety Board says "operator fatigue" has been tied to 39 major accidents involving planes, trains, buses and big rigs in the last 15 years, killing or injuring more than 1,000 people.

"I think it's getting more frequent because we have more and more people doing shift work than they used to - up to 25 to 35 percent of the American work force does shift work and this has them working irregular hours," Epstein said.

An alarming wake up call, growing louder by the day.



<http://www.cbsnews.com/video/watch/?id=7362774n>

## **One in five pilots 'suffers cockpit fatigue'**

One in five pilots suffers from fatigue in the cockpit at least once a week, a study seen by the BBC suggests.

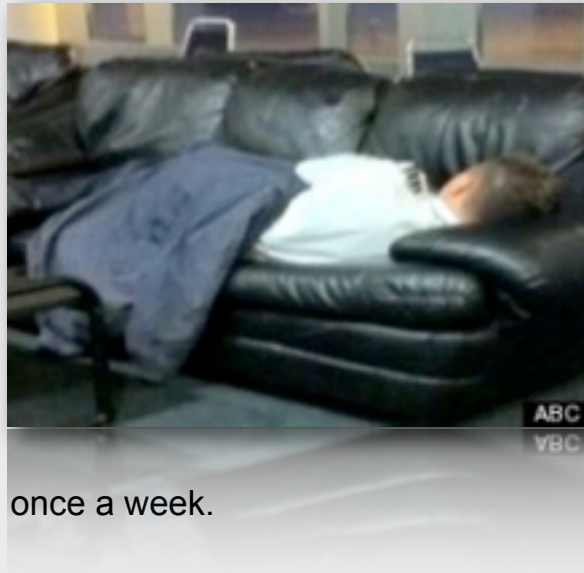
The study, commissioned by the British pilots' union, Balpa, and carried out by University College London (UCL), is due to be released on Thursday.

Balpa is worried the situation will get worse if European proposals regarding flying hours come into force. But European authorities claim the proposed changes will not lead to a reduction in safety.

The study by UCL sent questionnaires to pilots working for a major British airline.

A total of 492 replied, which marked a 47% response.

Some 45% of those said they were suffering from significant fatigue. One in five reported their abilities were compromised in flight more than once a week.



### 'I fell asleep'

One pilot who works for another large UK airline, but who did not want to be named, told the BBC that, about three months ago, both he and his co-pilot had very little sleep during their rest period.

On the subsequent flight, his co-pilot asked if he could take a nap, which the pilot approved. [But then the pilot fell asleep too](#) - for about 10 minutes.

"When I woke up, it was a big adrenalin rush. The first thing you do obviously is check your height and your speeds and all of your instrumentation," he said.

"The worst scenario is that the autopilot would disconnect itself and then the aircraft would lose or gain height and that would be extremely dangerous as you'd go into the path of oncoming aircraft.

"Now there are warning systems that tell you you are deviating from the correct altitude but they are not excessively loud - it would be easy enough to sleep through that, and I probably don't need to tell you what the consequences of that are."

### Failure to report

More than three-quarters of pilots who returned questionnaires admitted there were times within the past six months when they had been tired but [had not filed a fatigue report](#) with their airline.

About 14% of those who did not file a report when tired said it was because they did not want management [to have a less positive opinion of them](#). But 33% said they did not file a report because the [fatigue was their own fault](#).

The report also notes that those who chose to reply might have been biased towards reporting higher levels of fatigue in order to avoid the potential threat of new, more relaxed regulations.

Balpa, which commissioned the report, is warning that problems with fatigue could get worse under European proposals that would see the maximum flying time for UK pilots [going up](#) from 900 hours in a 12-month period to 1,000 hours.

"The problem with fatigue is that it slows your reactions down. When you are traveling towards the ground at 200 mph and you have to make a decision within one or two seconds, if you don't make that right decision, that can lead to disaster," said Dave Smith from Balpa.

"The landing can be 16 hours after the take-off and while the passengers have been asleep, we have to stay awake and we have to be at our alertest at the end of those 16 hours. That's a big task."

### Standardizing rules

At the moment, the rules for UK airlines are set by the regulator and are some of the toughest in the world. But airlines from other European countries operate under their own rules.

Not only that, but the rise of low-cost airlines has changed the way the industry works. For example, their crews will do far more take-offs and landings within their hours than pilots on long-haul flights, who spend more time cruising on autopilot.

So the European authorities want to standardize regulations across the continent.

Balpa would like the new regulations to [be set at the tougher, UK level](#). But other countries would be likely to object, saying that would be too much regulation and would damage their airlines.

So, in practice, the new rules are expected to relax the regulations for UK airlines, but make them much tougher for other airlines. That will benefit UK travelers on airlines with weaker rules.

"The change in the European regulations will mean some countries will raise their standards for the passenger which will of course include UK passengers traveling on those airlines," said Captain Bob Jones, head of flight operations for the Civil Aviation Authority (CAA).

The CAA is happy with some aspects of the European proposals but wants changes in other areas.

However, the European Aviation Safety Agency argues its proposed rules are just as safe as the current UK ones.



It is now considering the views of Balpa and the CAA before putting the final proposals before the Council of Ministers.

When the resulting proposals are approved, individual countries will have no choice but to adopt the measures.

## **ATR 72 in-flight upset traced to rudder maintenance fault**

Investigators are warning ATR operators that a crucial rudder component could be installed incorrectly in the turboprop, after the crew of an [Air Contractors](#) aircraft experienced serious control problems after take-off from Edinburgh a month ago. UK Air Accidents Investigation Branch inspectors determined that the twin-engined aircraft had [undergone routine maintenance](#) on its rudder immediately before the 15 March flight.

As the ATR 72-200 reached flight level 230, travelling through 185 kt, it rolled 5-10° left while the rudder trim indicated fully-right. The co-pilot, flying, disengaged the autopilot and applied aileron and right rudder in a bid to correct the roll and side-slip.

Some 15-20° of right bank was necessary to hold the heading constant. The crew requested vectoring to return to Edinburgh.

"The co-pilot had to operate the control wheel with both hands in order to maintain directional control," says the AAIB. "The commander operated the power levers in the latter stages of the final approach."

Neither of the two pilots, the only occupants of the ATR, was injured. The aircraft involved was a 21-year old airframe, serial number 183.

The AAIB found that the maintenance at Edinburgh had involved [disassembling the rudder's travel limitation unit](#), a system which reduces rudder deflection at speeds above 185kt.

Two cams form part of the engaging mechanism to reduce rudder authority. While the left-hand cam had been correctly installed, [the right-hand cam had been transposed through 180°](#).



"Neither an independent inspection nor an operational test of the [limitation unit] was performed," says the AAIB, even though a test of the unit after removal or installation is required by the aircraft maintenance manual.

The incorrect assembly was only discovered after the incident and the AAIB says that the maintenance manual does not indicate that the cam can be installed wrongly, which can lead to uncommanded rudder input in flight.

It has urged ATR to inform operators of the potential problem and to revise testing procedures in the maintenance manual. The AAIB states that ATR "intends to take the necessary actions" in response to the investigation.

## **NEAR-MISS JET SCREEN WAS DIRTY**

The Tornado pilot from RAF Lossiemouth was on low-level training flying at more than 480 mph

A DIRTY windscreen was partly to blame for a mid-air near-miss between a Tornado fighter jet and a private aircraft, an investigation has revealed. It said the RAF pilot was unable to clear the cockpit screen because the wash bottles were no longer being filled up in the £25 million aircraft.

The planes closed to within around 500 ft while flying over the Cairngorm mountains in Scotland in October.

According to the UK Airport Board report, the pilot from RAF Lossiemouth was on low-level training flying at more than 480 mph.

It concluded late sightings by both pilots were to blame but said the RAF crew should have returned to base if the screen was so dirty.

The MoD did not comment on screen wash bottles not being replenished.



# FAASafety Team Maintenance Safety Tip April 2011

FAA Safety Team | Safer Skies Through Education

## **Maintenance Safety Tip**

Notice Number: NOTC2911

### Hardware

Over the years, I have come into contact with many different types of aircraft hardware. Someone who is newer to the trade or a layman might think that what they are looking at is just a bolt or nut. That statement, as you know, could not be further from the truth. Because you took it off and that was the hardware that was holding it together, it must be correct. Well, [that is an assumption](#) and we all know what happens when you assume.

More than once I have been tasked with doing maintenance on this or that only to find out that the [improper hardware](#) had been used by the previous mechanic.

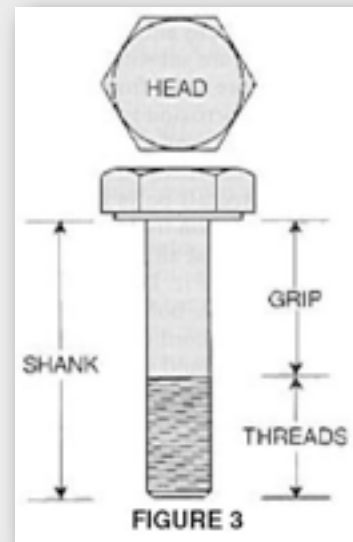
We as professional aircraft technicians should always look to [see what the manual says](#) the correct type of hardware really is. If the correct bolt or nut is not in stock is there another one I could use? We have to go back and dig through the manual again, don't we. See a theme here?

The simple fact is that just because it is the same diameter and tread pitch doesn't mean we can use it. This does not apply only to nuts and bolts. It could be something as simple as safety wire; yes, safety wire. Confused yet?

We all, from time to time, should go and reeducate ourselves on the subject of Aircraft hardware. As I learned in my early years, there is a vast difference. What is the application going to be? Is it in a hot area? Will there be torsion or will it be used in a shear application? What is the material and KSI rating\* required for the application? These are just a few things that determine what will be used.

Sometimes it does one good to sit down with a good technical manual and stretch that gray matter. Someone once told me [you don't know what you don't know!](#) It might surprise you what you could learn.

\* KSI rating = 1,000 pounds per square inch



## **Audit Initiated of FAA's Aviation Safety Inspector and Analyst Staffing**

### **Summary**

As directed by Congress in the Airline Safety and FAA Extension Act of 2010, the Office of Inspector General plans to review the Federal Aviation Administration's (FAA) Aviation Safety Inspector (ASI) and Operations Research Analyst (ORA) staffing at commercial (i.e., Part 121) air carriers. The National Transportation Safety Board also highlighted this issue in its report on the 2009 Colgan Air accident, concluding that commercial carriers that experience rapid growth, increased complexity of operations, or increased accidents or incidents [warrant more stringent FAA oversight](#). Therefore, our audit objectives are to: (1) evaluate FAA's process for assigning ASIs and ORAs to each Part 121 air carrier; (2) assess the number and level of experience of ASIs and ORAs assigned to each Part 121 air carrier; and (3) evaluate FAA's use of other surveillance processes to supplement the inspections performed by assigned oversight offices.



<http://www.oig.dot.gov/sites/dot/files/FAA%20Safety%20Inspector%20Staffing%20Announcement%20Letter.pdf>

## **Unseen loading error led Qantas A330 to depart overweight**

Investigators have determined that a [failure to detect a discrepancy](#) in loading documentation led a Qantas Airbus A330-300 to depart above maximum weight limits.

The twinjet was 884 kg above its maximum take-off weight and 384 kg above maximum taxi weight when it left Sydney for Hong Kong.

This oversight led the crew to enter inaccurate centre-of-gravity and zero-fuel weight data into the A330's computer systems, [and delays in notification of the loading error](#) meant the jet operated 10 more sectors before undergoing precautionary maintenance checks.



Australian Transport Safety Bureau investigators have catalogued the chain of events on 6 March 2009, stating that the aircraft had originally been predicted to be overweight.

While the A330 was being prepared at Sydney, proprietary flight management software predicted that, given the operational demands, the aircraft would be overweight.

The load controller examined options for removing some of the freight pallets and, in the course of this discussion, checked that they could be locked down in their assigned position.

But owing to the nature of the software this action generated a premature load instruction report that was automatically sent to the ramp.

When the load controller finalized the loading configuration of the aircraft - electing to remove a heavy pallet and replace it with a lighter one, to bring the weight within limits - the previously-issued loading instructions were not amended.

["That resulted in the ramp staff being unaware of the changed loading requirement and the loading proceeded as initially planned,"](#) says the ATSB.

"The discrepancy between the actual aircraft load and operator's load management system was not detected during the completion of the load controller's 'final distribution check' prior to issuing the final load sheet to the flight crew."



As a result of the carriage of a heavier pallet than indicated during the loading check, the A330 (VH-QPJ) departed with 1.62t more freight than indicated. The net effect was that the [jet exceeded](#) its maximum taxi and take-off weights. Although ground staff in Hong Kong noticed a discrepancy in the freight consignment, the required documentation was not completed and the carrier's safety department did not become aware of the event [until six days later](#). Records showed that the maximum taxi weight was exceeded by 0.2%. No damage was detected during the eventual overweight taxi check. But the ATSB says that, although this figure was minor, "a discrepancy between the [calculated] and actual aircraft loading had the potential to affect the safety of flight".

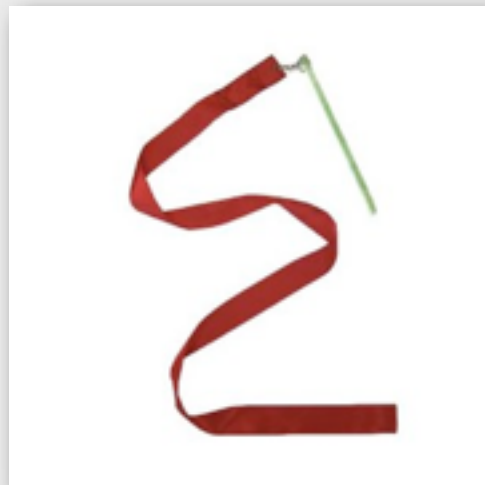
In its report into the event the ATSB states that while "no safety issues were identified", the operator implemented several changes to the process for managing load control.

## Safety Nets

Anyone who has ever been to the circus has seen the entes strung below high-wire walkers and aerialists. As professional acrobats, the performers almost need the nets. But on those rare occasions when they slip, those nets save lives.

[Maintenance operations need similar safety nets](#). Taking the place of netting, the right policy and procedures can catch an error before becoming an accident. Gordon Dupont, CEO of Vancouver, B.C.-based System Safety Services, is a big proponent of safety nets. As a former accident inspector, he has seen the way they [can stop and error from escalating](#). He also has seen what happens when they aren't in place. For instance, take the problem of [distractions](#), say Dupont. It is not unusual for a technician to be working on a task and be asked to lend a hand elsewhere on the aircraft. He or she might also fall into conversation with a co-worker or take a coffee break before that task is completed.

How do your technicians ensure they don't wind up a step or two ahead when they return to the task?



“It’s easy for your mind to think you are further along in a task than you are,” Dupont says. “If you leave a task, you need to leave yourself a [visual clue](#) telling you where you left off.” That visual clue is your safety net.

Dupont recently worked with a helicopter maintenance facility that started tying red flagging tape to any incomplete job. Soon after the safety net was implemented, a technician who had just loosened the oil line on a helicopter had to leave to pick up a part. Per the new policy, he tied red tape to the lines. During his absence, another helicopter landed nearby, and an employee, noticing the loose and shaking cowling of the craft in maintenance, closed the cowling so dirt would not get in. Shortly thereafter, the pilot showed up. Seeing the cowling closed up, he assumed the helicopter was ready to go. During a walk-around, however, he noticed red flagging tape sticking out and figured he’d better talk to the mechanic. In other words, the red tape did its job.

Dupont saw the grim results of what can happen when safety nets aren’t in place one morning above a Canadian airfield. An engine fire resulted in a wing separation and crash that [killed all seven people](#) onboard.

The technician who worked on that engine the previous day figured out what went wrong. He remembered being underneath the engine replacing the carburetor fuel flinger screen when an apprentice asked him for help. The technician had just hooked up the fuel line and twisted the nut finger tight. He got out from under the engine to help and, as he thought back, realized with horror that he had never finished tightening the nut with a wrench.

A simple case of distraction meant the nut had loosened during flight, allowing a spray of gasoline to escape and the fire to start. The NTSB reached the same conclusion. Safety nets cost nothing to implement but can be instrumental in catching an error before it slips into something very costly.

## **'Magic skin' could make aircraft lightning-proof**

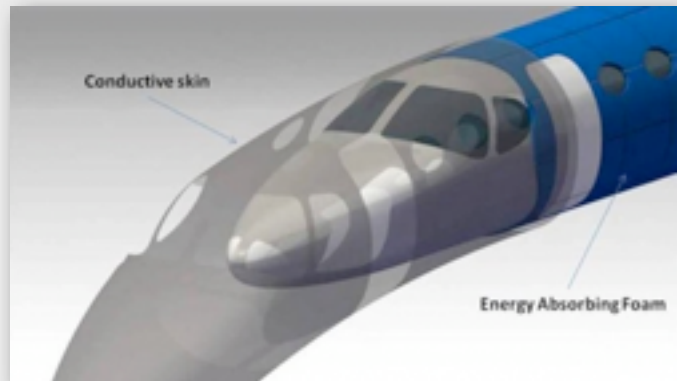
Cessna says new layers of materials also might improve fuel efficiency

Aircraft maker Cessna is developing a ["magic" skin](#) for airplanes that will serve as a kind of high-tech film capable of [encasing an entire plane](#) and protecting it against lightning and other weather conditions.

The development is part of a larger project funded by NASA to build a futuristic airplane that is quieter, more fuel-efficient and impervious to extreme weather.

The plane that Cessna is designing won't be made of aluminum, like most planes, but composite material that is lighter weight to improve fuel efficiency. The downside of using these materials is that the plane will need an outer layer to protect it from the elements.

"What we're doing is trying to come up with a set of layers or skins that would provide the ability to absorb impacts, would smooth the outer surface so that you could get low drag, and would conduct electricity so that you could meet the lightning-strike requirements," said lead Cessna engineer for the NASA contract Vicki Johnson.



"Right now, we're at the point of trying to define what are the requirements and what are the potential materials that we might combine in various manners to come up with skins that would meet our requirements," Johnson told TechNewsDaily.

The high-tech skin that Cessna wants will serve multiple functions and thus likely be made of several layers. For example, a foam layer might be used to protect the plane from bumps and bruises, and a reflective material could help to keep the composite cool.

Another integral part of this magic skin: sensors. "The idea is that there will be a little bit of space available (in the core material), whether it's a honeycomb core or a foam core, [to run wires and to put sensors](#)," Johnson said. "Those sensors could be there for a lot of different functions."

For example, sensors in the skin could help monitor the plane's structure and indicate, for example, whether an object in the air or on the ground has struck the plane.

Such sensors are particularly important for composite planes because a composite could be internally damaged with no visible signs on the outside of the material, Johnson explained.

"Another alternative would be to design the very outer layer so that if there was an impact [it would change colors](#), kind of like a bruise and you would see, uh-oh, something happened here," he added.

Cessna plans to start testing some of these magic skins this summer and have something ready for NASA in the next two years. In addition to Cessna, MIT, Boeing and Northrop also split the \$16.5 million in additional funding from NASA to continue their individual research into aircraft technologies that are three generations more advanced than what we have today.

[http://www.msnbc.msn.com/id/42500339/ns/technology\\_and\\_science-tech\\_and\\_gadgets/](http://www.msnbc.msn.com/id/42500339/ns/technology_and_science-tech_and_gadgets/)

## **Killed by overtime**

The eight-hour work day is becoming obsolete, as companies pressure employees for “productivity”-that is, long work days. But employees may pay the [ultimate price for overworking](#), a new British Study finds. Researchers followed than 7,000 healthy, middle-aged U.K. government employees for roughly 12 years and discovered that those who reported clocking 11-hour day [had a 67 percent higher risk of heart attack](#) than those who logged a more moderate 7-8 hours. Ten-hour workdays produced a 45 percent higher risk. “This study might make us think twice about the old adage “hard work won’t kill you.” “ Stephen Holgate, a chairman at Britain’s Medical Research Council, tells Reuters.com. Scientists aren’t sure exactly how overtime harms the heart or whether it simply [contributes to other risk factors](#) like unhealthful eating, failing to exercise, stress, depression, and lack of sleep. Clearly, though--just like blood pressure, cholesterol, and smoking--[work habits are a predictor](#) of heart health. Doctors should start asking patients: ‘How many hours do you work?’” says researcher Mika Kivimaki of University College London. “Our research presents, as strong case that it should become standard practice.



## For good health, best time to start work is after 9 a.m.

It takes people working around the clock to keep modern society functioning. But studies show people who [work night or graveyard shifts pay a price](#). Working at night is linked to disrupted sleep patterns and an increased risk for several types of health problems, including [obesity](#), heart disease and cancer. The [fatigue](#) that results from working odd hours increases the rate of accidents and mood disorders, too. A new study shows just how sensitive humans are to work shifts. Using a mathematical model, researchers found that the total duration of sleep ranges from 4.5 hours to 8 hours, depending on the start time of a person's work shift. The [maximum estimated sleep duration occurs](#) among people who start shifts between 9 a.m. and 2 p.m., said the researchers, from Washington State University's branch in Spokane. The [minimum estimated sleep duration occurs](#) when the shift starts between 8 p.m. and midnight.



Minimum on-the-job fatigue occurs when a shift starts at 9 a.m. and maximum fatigue occurs when the shift starts at 11 p.m. Workers who start shifts just after midnight fare better than workers who start at 11 p.m. probably because starting work after midnight allows those individuals to sleep before work. Shifts that start just before midnight [do not allow for a sufficient pre-shift sleep](#) because the timing conflicts with the body's circadian rhythm. Early evening is a time of day when the body is geared to be alert.

The take-home message of the study is that employers may want to avoid scheduling work shifts that start between 8 p.m. and midnight. The study was presented at the Associated Professional Sleep Societies meeting.



## Books connect with headlines

### Airframe

You may enjoy the writing of Michael Crichton. He is the author of the novel “[Airframe](#),” published in 2001.

“Michael Crichton always writes intelligent thrillers that always seem to tap into issues that concern society,” he said, “whether it is cloning, sexual harassment, the role of the media, or as in ‘Airframe,’ the [issue of flight safety](#) and failures in government regulation. ”Though “Airframe” is a decade old, [airline safety is in the news](#) after a Southwest Airlines plane had a 5-foot hole ripped in its fuselage.

“Airframe” begins with a frightening midair disaster aboard a commercial jetliner flying from Hong Kong to Denver. The cabin’s interior is destroyed and the result is three dead passengers, 52 injured, and a whole lot of unexplained questions about what caused the deadly incident.

Experts are brought in by Norton Aircraft, the plane’s builder, to pinpoint the cause. Enter the heroine, young Casey Singleton, an aviation expert and public relations liaison for the company.

Casey is a determined investigator who must answer whether it was pilot error, aircraft maintenance, or Norton construction — or a combination that caused the deaths. Moreover, she has to find the solution within seven days, as a major purchase of Norton planes by China will be lost if the problem turns out to be the manufacturer’s design or construction.

Management has high expectations that Casey, as head of the incident review team, will quickly find the “right” answer. But she encounters an unhelpful, tight-lipped crew; angry union workers; and constant scrutiny from reporters who seem more concerned with the sensationalism of how something looks and sounds on air than communicating the truth to the public.

What is amazing most about ‘Airframe,’ is the breadth and depth of Crichton’s [research](#) into airplane design, construction, and maintenance.

Even though Crichton has a medical degree, in ‘Airframe’ he goes into amazing detail of the aviation industry.



You may agree that this is a very readable book and that the scientific material and technical material is digestible for even the casual reader.

## **Secrets from the Tower**

Secrets from the Tower by Author Bob Richards gives the reader an [inside look](#) at the life of an air traffic controller at one of the world's busiest airports. of people travel via air every day and give little thought to what is happening behind the scenes. Secrets from the Tower brings the reader close and personal to the action that. Bob Richards has written an exciting, captivating, and sometimes heart-breaking, true story of a fledgling air traffic controller becoming one of the most experienced in the industry. Secrets from the Tower details not only the [fast-paced, high-pressure life](#) of an air traffic controller but also how that [lifestyle affects a man and his family](#). Secrets from the Tower is a must read for travelers, aviation buffs, and autobiography lovers alike. Secrets from the Tower is witty and heart-wrenching, fast-paced.

