

# Aviation Human Factors Industry News

*Volume XIV. Issue 08, April 15, 2018*



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

Hello all,

To subscribe send an email to: [rhughes@humanfactorsedu.com](mailto:rhughes@humanfactorsedu.com)

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

★Free 3 Day Human Factors Workshop

★Pilots Warned of Safety Concerns Before NYC Helicopter Crash

★FBI Offers Reward for Capture of Fugitive Mechanic in ValuJet Crash

★Aircraft Collide During Engine Test Run

★Human Factor Extra: Top-of-Descent Landing Assessment

★NSC Calls for Distracted Driving Legislation

★NTSB Report Re-Emphasizes Root Cause Of Fan Cowl Door Loss

★And Much More

# HUGE AVIATION EVENT

## "Free" Three Day Human Factors Workshop



Who should attend? – Anyone that works in or around aviation

All IAM Represented Company CEOs, VPs, Managers, Supervisors & Trainers

All ACLC and Families / All M1 Contractors and Families

All ATL and BHM FAA FSDO employees and families

All FAASTeam Program Managers, Representatives, and Members

ALL Airmen: Pilots, Flight Mechanics, Crews, Mechanics (Licenced / Unlicenced)

**DATES: 8, 9 and 10 MAY (0800 – 1700)**

**WHERE: IAM Union Hall - 345 US-84, Daleville, AL 36322**

**RESERVATIONS ARE REQUIRED**

(Seating is LIMITED to twenty participants)

Send Reservation Requests to:

[thistleaviationconsultants@gmail.com](mailto:thistleaviationconsultants@gmail.com)



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In an interview with investigators for the National Transportation Safety Board last month, Vance said he had given safety instructions to the passengers, explaining twice how to use a tool to cut their seat belts if necessary. Investigators confirmed that the tools were attached to their harnesses, according to a report released after the crash and reported by Hearst Connecticut Media.

The day of the crash, Vance said they were nearing Central Park when he noticed that the front seat passenger's harness was loose. Vance said he told the passenger to put the harness back on, and the passenger complied.

Later in the flight, Vance said he tried to turn the Eurocopter AS350 to the right, but the craft turned more sharply than he expected. An alert sounded in his headset, and then warning lights began flashing.

Vance said he considered landing in Central Park, but there were "too many people" on the ground and flew toward the East River instead. He made a distress call to air traffic control, tried and failed to restart the engine, and then prepared to land on the water.

Investigators found no signs of oil or fuel leaks or fire in the engine. [The fuel flow control lever was off](#), while the emergency shutoff lever was in the open position. The wire between the fuel shutoff lever and the engine control housing [was broken](#), according to the report.

The Federal Aviation Administration has grounded open-door flights with restraints that cannot be quickly released until they're equipped with restraint systems that open with one action, according to media sources.

The FAA also said it was conducting a "top to bottom review" of its rules covering open-door flights.

## **FBI Offers Reward for Capture of Fugitive Mechanic in ValuJet Crash**

The FBI is still seeking Mauro Ociel Valenzuela-Reyes, a mechanic who worked for ValuJet Airlines' maintenance contractor, SabreTech. He was [facing criminal charges](#) in 1999 following the crash of ValuJet Flight 592 in 1996.

Crash investigators determined he had a role in the [mishandling and packaging of oxygen generators](#) that were placed in the DC-9's cargo hold.

The FBI's Miami Field Office is offering a \$10,000 award for information leading to the capture of Mauro Ociel Valenzuela-Reyes, a mechanic who worked for ValuJet Airlines' maintenance contractor, SabreTech. He was facing criminal charges in 1999 following the crash of ValuJet Flight 592 on May 11, 1996, shortly after takeoff from Miami

International Airport en route to Atlanta. The plane crashed into shallow, marshy waters of the Everglades, killing both pilots, the three flight attendants, and all 105 passengers on board. Crash investigators determined he had a role in the mishandling and packaging of oxygen generators that were placed in the DC-9's cargo hold. [The generators were missing their required safety caps, and they ignited in the cargo area.](#)



Valenzuela-Reyes fled before trial, and FBI Miami has been searching for him since then. "We want closure," said FBI Miami Special Agent Jacqueline Fruge, who has been the primary agent on the case since it began and has worked with the victims' families.

According to the FBI, Valenzuela-Reyes has connections to Atlanta, where his ex-wife and children have lived, and Santiago, Chile, where he has family and may be living today under a false identity. "We've tried over the years to find him," said Fruge. "It bothers me. I've lived and breathed it for many, many years."

Two other SabreTech employees who were charged in the criminal case were acquitted, according to the FBI news release, which says if he is captured, Valenzuela-Reyes would face charges related to the crash and additional federal charges, issued in 2000, for fleeing and failing to appear at his trial. The new reward and a wanted poster are being circulated in Chile as well as the United States.

The National Transportation Safety Board determined the probable causes of the accident, which resulted from a fire in the plane's [class D cargo compartment](#) that was initiated by the actuation of one or more oxygen generators being improperly carried as cargo, were [1\) the failure of SabreTech to properly prepare, package, and identify unexpected chemical oxygen generators before presenting them to ValuJet for carriage; 2\) the failure of ValuJet to properly oversee its contract maintenance program to ensure compliance with maintenance, maintenance training, and hazardous materials requirements and practices; and 3\) the failure of the Federal Aviation Administration to require smoke detection and fire suppression systems in class D cargo compartments.](#) Contributing to the accident was the failure of the FAA to adequately monitor ValuJet's heavy maintenance programs and responsibilities, including ValuJet's oversight of its contractors, and SabreTech's repair station certificate; the failure of the FAA to adequately respond to prior chemical oxygen generator fires with programs to address the potential hazards; and ValuJet's failure to ensure that both ValuJet and contract maintenance facility [employees were aware of the carrier's "no-carry" hazardous materials policy and had received appropriate hazardous materials training.](#)

<https://www.fbi.gov/news/stories/new-reward-for-fugitive-in-1996-valujet-crash-040518>

[https://www.nts.gov/news/events/Pages/In-Flight\\_Fire\\_and\\_Impact\\_with\\_Terrain\\_ValuJet\\_Airlines\\_Flight\\_592\\_DC-9-32\\_N904VJ\\_Everglades\\_Miami\\_Florida\\_May\\_11\\_1996.aspx](https://www.nts.gov/news/events/Pages/In-Flight_Fire_and_Impact_with_Terrain_ValuJet_Airlines_Flight_592_DC-9-32_N904VJ_Everglades_Miami_Florida_May_11_1996.aspx)

## **Aircraft Collide During Engine Test Run**

Two aircraft were damaged during an engine test run at Mexico City-Benito Juárez International Airport on March 29, 2018.

According to initial reports the Aeromar Airline ATR 72-600 [jumped the chocks during an engine test run.](#)

It continued taxiing until the engine hit the rear fuselage of another Aeromar ATR 42-500. The tail cone and rudder of ATR 42-500 sustained substantial damage.

A story on the News InFlight website said “the ATR72 will be repairable, while the ATR 42-500 will be written off. The ATR 42-500 had been out of service for several months and was sold to new operator, but now it is a total loss,” the site said.



## **Human Factor Extra: Top-of-Descent Landing Assessment**

Listen to a two-member flight crew make a top-of-descent assessment in this bonus episode of [AIN's \*The Human Factor\*](#).

### **Topics the bonus episode will cover: Safety**

- Landing in bad weather
- Top-of-descent landing assessment



<https://soundcloud.com/the-human-factor-ain>

## **NSC Calls for Distracted Driving Legislation**

The NSC believes [a full ban on use of electronic devices](#) while driving is the best way to keep drivers safe. While many states have implemented partial distracted driving laws, data collected by NSC shows that other states are behind in addressing the issue.

Distracted Driving Awareness Month begins [Sunday, April 1](#), and the National Safety Council is urging legislators across the country to observe by enacting comprehensive laws to further prevent distracted driving injuries and deaths.

The NSC State of Safety report grades states on actions and policies they have taken—or inaction—toward reducing risk for their residents. The report evaluated each state and Washington, D.C., on whether they have a texting ban for all drivers and a total cellphone ban for teens and inexperienced drivers.

Four states—[Florida, Arizona, Montana, and Missouri](#)—do not have legislation in either area, and 16 states have only addressed one of the two areas. Since the report's completion last year, New Mexico, Texas, and Iowa have joined 27 other states and D.C. in passing legislation to address both areas.

"The National Safety Council is encouraged to see legislators addressing distracted driving at the state level, but more work needs to be done," said NSC President and CEO Deborah A.P. Hersman. "No state currently has a law that completely bans all electronic-device use behind the wheel, and the Council believes a full ban – including a ban on hands-free electronic devices – is the most effective way to prevent distracted driving crashes."

NSC observes Distracted Driving Awareness Month every April [to remember the thousands of injuries and deaths](#) caused each year by preventable crashes.



## **NTSB Report Re-Emphasizes Root Cause Of Fan Cowl Door Loss**

Reconstructed Aruba Airlines A320 fan cowl door

Reports from regulators find fan cowl door loss incidents related to [human factors, not equipment.](#)



A new NTSB report detailing a 2016 incident involving an improperly closed fan cowl door (FCD), provides another example of what operators have labelled a [“recurring human factors issue.”](#)

In September 2016, an Aruba-bound Airbus A320-200 circled back to Miami after the outboard FCD separated, damaging the engine, landing gear and fuselage. The safety board concluded that the door was improperly latched after a routine maintenance check.

Since 1992, the A320 family has experienced more than [40 similar incidents](#), resulting in a long list of regulatory actions.

In 2000 and 2001, the French civil aviation authority issued a set of rules mandating lock improvements and hold-open devices to combat non-detection of improperly closed cowl doors. A subsequent European Aviation Safety Agency (EASA) directive [deemed those safety measures inadequate](#) and prescribed additional remedies, including installation of [new front latch and key assemblies](#). The mandate necessitates confirmation that the FCD key is properly stowed in the flight deck as part of the [pre-flight inspection](#).

The FAA's adoption of the EASA airworthiness directive—which comes with a price tag of \$5.6 million for U.S. operators—was met with resistance. Commenters deemed the requirement overly prescriptive and inadequate for addressing the root cause: [human error](#).

Airlines argued that design changes historically have proven ineffective [in deterring human error](#), compared to other changes, such as dual inspection sign-offs. Instead, the introduction of further pieces of equipment, they maintained, could lead to other operational complications, and “impose an unnecessary financial and maintenance burden on operators that have proactively implemented alternate procedures.”

At the time of the Flight AG820 incident, Aruba Airlines was in the process of modifying its fleet to comply with the EASA front latch and key assembly requirements. Since then, only Bangkok Airways experienced a similar incident when on July 25, 2017, both cowl doors on an A320 detached during takeoff.

## **Recent Incidents Raise Concerns about Safety**

by [John Goglia](#)

Today I'm writing to you about some news reports from the world of aviation that have left me shaking my head. I've seen a lot over my decades in aviation—starting as a teenager pulling bodies out of Boston Harbor after the crash of Eastern Airlines Flight 375, a Lockheed Electra that hit a flock of starlings, and through my years with the airlines as a union member and [later as an NTSB member](#) on scene for far too many fatal crashes—but I still manage to be dismayed at times by what I read and see that goes on. Some of the things I see are as a safety consultant, but what I will focus on here is what I see in media or other public reports.



The first comes from news reports involving a Spirit Airlines Airbus A320 that flew from Akron, Ohio to Fort Lauderdale, Florida, on January 28. According to an FAA statement to the news media, the crew made an emergency landing after reporting fumes in the cockpit. The *Aviation Herald* reported additional detail from its sources:

“[The flight] was en route at FL380 about one hour before estimated landing, when a passenger began to complain about an abnormal smell on board. Cabin crew attending to the passenger confirmed the unusual smell, which became stronger and stronger until the cabin air became nearly 'not breathable.' The flight crew was informed, informed ATC about the fumes on board, and began to descend the aircraft early. About 20 minutes before landing the captain confirmed the odor in the cockpit, too, [and] the flight crew donned their oxygen masks. Flight attendants felt increasingly nauseated, a number indicated they nearly passed out over the odor. Below 10,000 feet the captain depressurized the aircraft, [and] the cabin air improved. The aircraft landed on Fort Lauderdale's Runway 10L about one hour after the first passenger complaint. Emergency services needed to treat flight and cabin crew still on board of the aircraft, all cabin crew and flight crew were taken to hospitals.”

Whatever the cause of the fume event, what caught my eye in the article was a statement that after the aircraft landed, maintenance personnel boarded the aircraft, did not detect any odor and [were about to return the aircraft to service](#) when the captain interceded. The aircraft was then kept out of passenger service for approximately 28 hours. The FAA investigation is continuing and now includes an emergency landing by the same aircraft a week later involving an engine shutdown in flight for excessive vibration.

While the incidents themselves may not be related, I hope the FAA looks closely at whether the reported exchange between maintenance and the captain is accurate. If it is, it raises questions about the [maintenance safety culture](#) at the airline. Unfortunately, my experience with FAA investigations is that inspectors all too often rely on paper records and do not probe an [airline's safety culture](#). Maybe this time will be different.

Another report in the news that caught my attention was the NTSB's accident report on the Oct. 28, 2016 uncontained engine failure and subsequent fire on an American Airlines Boeing 767. The cause of the uncontained engine failure, according to the report, was "a high-pressure turbine (HPT) stage 2 disk rupture. The HPT stage 2 disk initially separated into two fragments. One fragment penetrated the inboard section of the right wing, severed the main engine fuel feed line, breached the fuel tank, traveled up and over the fuselage, and landed about 2,935 ft away. The other fragment exited outboard of the right engine, impacting the runway and fracturing into three pieces."

My concern is the emergency evacuation that followed the uncontained engine failure. The NTSB has called out several concerns about American's procedures and crew actions during the evacuation, but my specific concern here is with the continuing problem of [passengers stopping to take their carry-on bags with them during an emergency](#). Passenger cellphone and other on-scene photos for innumerable survivable accidents over the last few years have recorded this phenomenon. In this accident, media pictures clearly showed passengers with all manner of carry-ons, including a number of what appeared to be roll aboards. The problem of passengers retrieving their bags during an emergency evacuation continues, and I have not seen much action by the FAA or the airlines to deal with it.

So, I was heartened to see the Board's report specifically call out the problem of passengers taking their carry-on bags during an emergency evacuation. In its enumerated Findings, the Board stated: "Evidence of passengers retrieving carry-on baggage during this and other recent emergency evacuations demonstrates that previous FAA actions to mitigate this potential safety hazard [have not been effective](#)."

Among the Board's new safety recommendations to the FAA: conduct research to (1) measure and evaluate the effects of carry-on baggage on passenger deplaning times and safety during an emergency evacuation and (2) identify effective countermeasures to reduce any determined risks, and implement the countermeasures.

On this particular flight, the flight attendants decided trying to stop passengers from retrieving their bags would further impede the evacuation.

It's clear from this and other accidents that control of carry-on bags cannot be left to shouted crewmember instructions, arguing with passengers at the emergency slides, and certainly not getting into a tug-of-war with them while a fire spreads and other passengers are prevented from exiting the plane.

It is patently clear now that something more needs to be done. Passengers—at least some passengers—will hinder the evacuation process by retrieving bags from under the seat in front of them or even the overhead bins. Hopefully, the FAA and the airlines will address this problem before lives are lost because someone needed to grab their laptop or other carry-on item before getting out.

The last troubling report comes from the world of drones and the recent video that purports to be a drone flying close to an airliner landing at McCarran Airport in Las Vegas. As I write, it has not been definitively established whether the video is real or a computer simulation, but either way it's a really dumb stunt. It's these kinds of reckless videos that can lead others to try similar stunts, and one day the results could be much more significant. If the drone video is a simulation, it should clearly state that. If the drone operator had specific permission to fly the stunt, it should clearly state that. And if the video is real and the drone operator was flying as close as it appears to a landing passenger flight, the FAA should prosecute to the fullest extent of the law.

<https://www.ainonline.com/aviation-news/air-transport/2018-02-14/drone/aircraft-encounters-prompt-call-tighter-regulations>

## **Former FAA Inspector Pleads Guilty To Fraud**

A former FAA safety inspector pleaded guilty to [multiple federal felonies](#). He is accused of accepting bribe money he used to buy a Taylorcraft, paid in exchange for [intentionally failing to conduct required inspections](#) on a helicopter operator in Guam, Hansen Helicopters. The company's maintenance practices have been called into question by the NTSB.

In an agreement with federal prosecutors revealed this week, Timothy Cislo pleaded guilty to three counts of honest services wire fraud. He could face up to \$750,000 in fines and 20 years in prison.



Prosecutors charged Cislo with accepting funds from Hansen Helicopters or its representative in 2014, to purchase a Taylorcraft BC-12D with an estimated value of approximately \$20,000. The money was paid in exchange for issuing and reissuing special airworthiness certificates for helicopters without performing the requisite inspections. In emails with Hansen employees, Cislo referred to these illegal certificate approvals as “sign-fests,” according to prosecutors. Hansen operates a fleet of Hughes/MD 369/OH-6s for a variety of missions, including fish-spotting throughout the Pacific for large Japanese tuna boats.

In late 2016, FBI agents raided Hansen facilities in Guam, Saipan, and Georgia, seizing airworthiness certificates, registrations, and logbooks for 15 of the company’s helicopters. They also confiscated several helicopters outright, including one being maintained by Hansen in the Philippines. This shut down most, but not all, of Hansen’s operations.

In February 2017, a Hughes 369A helicopter operated by a Hansen-affiliated company, “Jim’s Air Repair” (both companies have the same ownership nexus) based on the small island nation of Vanuatu, made a hard landing into the Pacific near Guam during a fish-spotting mission. The American pilot and the Japanese spotter survived with serious injuries, and the utility float-equipped helicopter was recovered.

## **ACCIDENT HIGHLIGHTS MAINTENANCE DISCREPANCIES**

The NTSB accident report **NTSB Identification: WPR17LA075** highlights several discrepancies. The pilot held only a third-class medical at the time of the crash and therefore was not qualified to fly commercially. The engine had 393.7 hours since last overhaul but the two hour meters inside the helicopter varied—one displayed a reading of 937.8 hours, and the other one displayed a reading of 1,245.9 hours—no one at Hansen seemed to know why. No fuel was observed in the fuel tank during the examination. The fuel pump power wire was not wrapped around the start pump fuel line, as it was required to be; this condition can result in an erroneous fuel quantity indication. In addition, the in-tank quantity sensor exhibited visible corrosion. A vacuum check of the engine fuel system indicated that there was a slow leak within the fuel system. During the check, systematic isolation of components traced the leak to a line that connected the fuel pump to the fuel control.

In addition, there was a lot of water in the fuel system, and it was unlikely that it was as a result of the water landing. As the NTSB noted, “The fuel system architecture precluded introduction of water into either the fuel pump or the FSN fuel line unless the engine was operating.” The Board found the “evidence was consistent with the water being present in the helicopter fuel system before the flight.”

Hansen declined to make the helicopter’s mechanic available to NTSB investigators or to provide an accounting of his qualifications. The company’s director of maintenance supplied the NTSB with maintenance records, flight records, and 337 forms. The NTSB wrote, “Exclusive of the 337 forms, [none of the contents conformed to the FAA maintenance entry requirements](#). The records contained multiple internal service time and/or component number discrepancies. According to the FAA inspector, cursory comparisons of the 337 forms with the records on file with the FAA in Oklahoma City revealed numerous discrepancies. The most recent recorded 100-hour/annual, 300-hour, or 600-hour inspection was completed and signed off by the Hansen Helicopters DOM on 5/7/16. On that inspection entry, the airframe time was listed as 6,891.1 hours, and the ‘Hobbs time’ was listed as 544.1 hours. The inspection entry stated ‘Next inspection due is a 100 hour at 6991.1 [hours].’ However, despite the fact that all available information indicated that the helicopter has accumulated nearly 400 hours since that inspection, no additional FAA-compliant inspection entries were observed for dates subsequent to 5/17/16.”

Although Hansen Helicopters filed the accident report, it maintained that it merely provided employment recruiting, training, and logistical support for Jim's Air Repair of Vanuatu.

Hansen Helicopters recorded two fatal crashes in the late 1990s. In a 1997 accident, the NTSB found that a [non-repairable trim switch had been disassembled and reassembled](#). In an accident a year earlier, the Board found that tail-rotor control was lost [due to improper maintenance](#).

[https://www.nts.gov/\\_layouts/nts.aviation/brief.aspx?ev\\_id=20170308X31846&key=1](https://www.nts.gov/_layouts/nts.aviation/brief.aspx?ev_id=20170308X31846&key=1)

## **Skip These 9 Preflight Items, And You'll Have Headaches In The Air**

It's your responsibility for a safe flight, and it starts with...

### **1) Weather Reports and Forecasts**

Before every flight, you need a weather briefing. Not only does this help you visualize current and forecasted weather, you'll also know about [NOTAMs](#) and TFRs along your route.

### **2) Fuel Requirements**

According to FAR 91.151, you need land with a fuel reserve of at least 30 minutes for VFR during the day, and 45 minutes at night. If you plan to fly IFR, FAR 91.167 says you need enough fuel to go to your original point of intended landing, to your alternate (if needed) and thereafter for 45 minutes at normal cruise speed.



### **3) Alternates**

If you fly IFR, you need to determine if you need an alternate. If the weather conditions forecasted an hour before to an hour after the ETA at your destination are less than 2,000' ceilings or 3 SM visibility, you need an alternate.

### **4) Known Traffic Delays**

These delays are typically included in weather briefings. They contain information regarding traffic congestion along the route, or in the terminal area. This allows you to plan ahead so that you don't find yourself holding at a clearance limit for extended periods of time, burning precious fuel.

### **5) Runway Lengths**

You need enough runway to land, and also take off. Takeoff distance is almost always longer than landing distance. Check your performance ahead of time - you don't want to find yourself stranded on a short runway with no way to depart.

### **6) Performance**

The last place you want to be is rotating on takeoff, realizing that you won't be able to clear obstacles on the departure end of the runway.

### **7) Weight and Balance**

This also plays in to performance calculations. Make sure you're within weight *and* balance limits before you go.

### **8) NOTAMs**

Whether it's [runway closures](#), NAVAID outages, or airspace restrictions, it's essential to review the NOTAMs for your flight.

### **9) Airworthiness**

Last but not least: preflight inspection. This means checking the required documents, maintenance inspections, and making sure your aircraft is ready for the air.

## PLANE RUNS OVER MAN'S FOOT AT GATWICK AIRPORT

A BAGGAGE HANDLER EMPLOYED BY DNATA HAS BEEN SERIOUSLY INJURED AFTER A RUSSIA BOUND PLANE RAN OVER HIS FOOT AT GATWICK AIRPORT LAST



WEDNESDAY. Passengers were confused as moments before takeoff the Rossiya plane halted and emergency services surrounded the area.

The man, who was [directing traffic on the runway](#), became trapped under the wheel of the aircraft until freed by ambulance crews.

A South East Coast Ambulance Service NHS Foundation Trust spokesman said: “The patient, an adult male, had suffered a serious lower limb injury and after treatment by our crews at the scene, was transported by Air Ambulance to St George’s Hospital at Tooting.”

As per *Fox News*, a representative for Aeroflot, the airline that owns Rossiya, issued a statement claiming the incident occurred due to a [“serious infringement of safety regulations”](#) on the Dnata employee’s part.

“As the A319 operating flight FV6620 from London Gatwick to St. Petersburg on 28 March was pushing back before takeoff, there was a serious infringement of safety regulations by an employee of Dnata, the local ground service company.”

“AS A RESULT, THE DNATA EMPLOYEE’S LEG BECAME TRAPPED UNDER THE MOVING WHEEL OF THE AIRCRAFT, CAUSING HIM AN INJURY.”

“The trapped employee was freed using non-standard equipment, and as a result, the aircraft suffered light damage requiring additional repair work.”

“The aircraft was temporarily removed from operations.”

## **Moving Light-dark Exposure Could Reduce Disruption Faced by Night Shift Workers**

New research published shows that our brain clock can be shifted by light exposure, [potentially to align it with night shift patterns](#). The findings, published in *The Journal of Physiology*, highlight that a “one size fits all” approach to managing sleep disruption in shift workers [may not be appropriate](#). A personalized approach, with light-dark exposure scheduled and taking into account whether someone is a “morning” or “evening” person, [could reduce the increased risk of health problems in shift workers](#).



Our sleep-wake cycle, in part controlled by our brain clock, encompasses physical, mental, and behavioral changes that follow a daily cycle. [Light is the dominant environmental time cue](#) which results in, for example, sleeping at night and being awake during the day.

Night time shift work disrupts the normal sleep-wake cycle and our internal circadian rhythms, and has been [associated with significant health problems](#), such as a higher risk of heart disease and cancer. Alertness levels are often markedly impaired while working night shifts.

While it has been known that there are considerable differences in how the brain clock of different individuals responds to changing shift cycles, we have known very little about the mechanisms that underlie these differences between people.

If someone was able to realign their brain clock to their shift pattern, [then it would improve sleep and could lead to health benefits](#). While such realignment is rare, in some circumstances such as on offshore oil rig platforms, complete adaptation has been observed.

This research aims to understand the relationship between light exposure and how an individual's circadian rhythm is affected across a transition from day to night shift schedules. The researchers found that [timing of light exposure is the primary factor](#) in determining how the brain clock responds to night shift work, accounting for 71% of the variability in timing of the clock observed in the study. It also found that the extent to which an individual is a "morning" or "evening" type affects how the body responds, which shows that a [personalized approach is important](#).

This study was led by the CRC for Alertness, Safety and Productivity and saw nursing and medical staff recruited from an Intensive Care Unit at a major hospital in Melbourne, Australia. Staff members were enrolled into the study when working a schedule of day or evening shifts, or days off, followed by at least 3 or 4 consecutive night shifts.

To examine how the sleep-wake cycle responds to the shift schedule, the timing of the brain clock was measured on the day schedule, and at the end of the night shifts. It was measured by monitoring urinary concentration of the major metabolite of melatonin, which is a hormone produced in the pineal gland known to be involved in the regulation of sleep cycles. Individual light exposure was measured using wrist actigraphs, worn for the duration of the study.

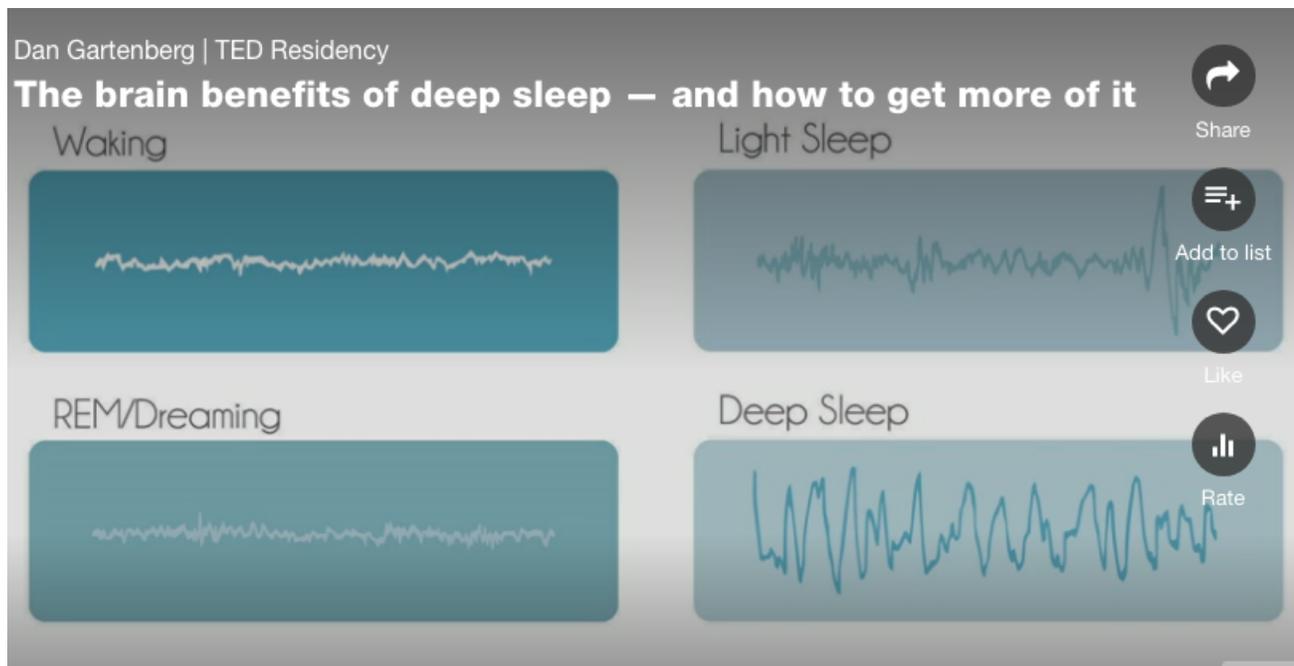
Shantha Rajaratnam, PhD, a professor at Monash University and the CRC for Alertness, Safety and Productivity, corresponding author for the study, says in a release, "We know that night time shift workers are more likely to suffer health problems [due to disruption of their circadian clock](#), and the mismatch between the timing of the clock and their sleep-wake cycle. This research is important because if we can realign a person's clock to fit their shift pattern, then they will sleep better and this may result in improved health, safety, and productivity.

"These results will drive development of personalized approaches to improve sleep-wake cycles of shift workers and other vulnerable people, and could potentially reduce the increased risk of disease due to circadian disruption."

<https://physoc.onlinelibrary.wiley.com/doi/abs/10.1113/JP275589>

## **TED Video: The Brain Benefits of Deep Sleep—And How to Get More Of It**

Dan Gartenberg is working on tech that stimulates deep sleep, the most regenerative stage which (among other wonderful things) [might help us consolidate our memories and form our personalities](#). He discusses the science in a TED Residency talk.



[https://www.ted.com/talks/dan\\_gartenberg\\_the\\_brain\\_benefits\\_of\\_deep\\_sleep\\_and\\_how\\_to\\_get\\_more\\_of\\_it](https://www.ted.com/talks/dan_gartenberg_the_brain_benefits_of_deep_sleep_and_how_to_get_more_of_it)