



## Aviation Human Factors Industry News January 09, 2008

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### [AirSafe.com's Review of Fatal Airline Events of 2007](#)

AirSafe.com has released its annual review of **fatal airline events of 2007**. There were a total of **eight fatal events** in 2007, including four that resulted in the deaths of everyone on board. While there were **no** events in North America, there were three in Asia, two each in Africa and Europe, and one in South America. The eight fatal events of 2007 is the **lowest number of fatal events** tracked by AirSafe.com in the last decade, a number also equaled in 2006 and 2003. Over the 10 year period 1998-2007, AirSafe.com has compiled 111 fatal airline events around the world.



This annual review is available in several formats: as an MP3 audio file, or as an MP4 or WMV video. To download the video, visit AirSafe.com at <http://www.airsafe.com>, or follow the link at the AirSafe.com Foundation at <http://podcast.airsafe.org>.

In addition to downloading the audio or video, directly from the site, both versions can be downloaded for free using iTunes.

The videos are also available on YouTube at <http://www.youtube.com> and Google Video at <http://video.google.com>. You can find video links and download instructions at <http://podcast.airsafe.org>.

To obtain a PDF file or PowerPoint presentation of this annual review, please contact AirSafe.com at [tcurtis@airsafe.com](mailto:tcurtis@airsafe.com).

PPT presentation: [http://www.airsafe.com/podcasts/review\\_2007.mp4](http://www.airsafe.com/podcasts/review_2007.mp4)

YouTube presentation: <http://podcast.airsafe.org>.

## [New FAA Rule Boosts Aircraft Wiring Safety](#)

WASHINGTON, DC - The Federal Aviation Administration (FAA) finalized a new rule designed to **mitigate conditions** that put airliners at risk for **wire failures, smoke and fire**.

The final rule greatly enhances the safety requirements for design, installation and maintenance of electrical wiring in new and existing airplane designs. It moves existing rules on wiring into a single section of the regulations, and adds new certification standards to address wire degradation and **inadequate design or maintenance**.



"We've gained enormous knowledge about aircraft wiring issues over the last decade," said FAA Associate Administrator for Aviation Safety Nicholas A. Sabatini. "With this rule, we are ensuring that wiring systems will be **properly designed, installed and maintained over the life of the airplane**."

Under the rule, manufacturers **must complete** FAA-approved instructions for new wiring-related maintenance and inspection tasks within 24 months of the effective date for existing airplanes. U.S. scheduled air carriers and foreign airlines operating U.S.-registered aircraft **must develop** maintenance and inspection programs for wiring based on the manufacturers' instructions within 39 months of the effective date, and update those programs as needed for subsequent aircraft modifications.

This final rule is a result of recommendations made by industry groups working with the FAA and international authorities. The **new maintenance** requirements apply to aircraft carrying more than 30 passengers or having a maximum payload of 7,500 pounds or more.

The estimated total cost of this final rule is \$416 million (\$233 million present value) over 25 years.

The rule is part of a broader FAA effort to **improve the safety** of a variety of aircraft systems, including wiring. The program looked at how connectors, wiring harnesses and cables were installed and how they **degraded** during an aircraft's service.

The entire rule can be viewed at:

[http://www.faa.gov/regulations\\_policies/rulemaking/recently\\_published/](http://www.faa.gov/regulations_policies/rulemaking/recently_published/)

## [Free Safety Management Systems Course.](#)

Company president and chief consultant Robert Baron, PhD (c) of The Aviation Consulting Group (TACG) is conducting a **Safety Management Systems** validation course at **no charge**. The 8 hour program will be held in Myrtle Beach, SC (MYR) on March 14, 2008. This introduction course includes course book, handouts and certificate of training. This class will fill quickly and is offered on a first come first serve basis. Industries outside aviation are also invited to attend.



The complete schedule can be found at:

<http://www.tacqworldwide.com/upcomingcourses.htm>

The Aviation Consulting Group core specialization focuses on human factors consulting, training, and research in aviation such as **human factors training** for maintenance, human factors/CRM training for flight operations and SMS. Consult their website at [www.tacqworldwide.com](http://www.tacqworldwide.com) for additional information.

## [Shortage of aircraft maintenance engineers](#)

CYBERJAYA: There is a need to overcome the **worldwide shortage of aircraft maintenance engineers** (AME).

Department of Civil Aviation director-general Datuk Azharuddin Abdul Rahman said the number of aircrafts has quadrupled in the past 20 years.

“In order to maintain these modern aircrafts, there is a need for people with **special skills and attributes**,” he said at the launch of Nilai International University College’s (NUC) diploma in aircraft maintenance engineering yesterday.



Air Service Training (Engineering) chief executive Peter Farrow who flew in from Scotland on Tuesday said that there is currently a **large gap** between existing AMEs and the younger generation of AMEs.

“There is a genuine shortage because of several factors that affected the aviation industry such as **changing economies**, the Sept 11 tragedy and SARS that resulted in no training being carried out for several years,” he said.

Farrow added that **China alone needed 210,000 AMEs** in the next five years.

NUC president Professor Emeritus Tengku Datuk Shamsul Bahrin said the aviation industry was rapidly expanding and as a result, **the demand** for AMEs will continue to grow.

“**Poor maintenance** is no longer an excuse for flight delays so we are assisting in the development of the industry to fulfill the needs and wants of the industry,” said Shamsul.

He added that NUC was looking at the international market with the intention of attracting **international students** in line with making Malaysia an education hub.

Azharuddin, a former AME himself, said that AME was a **very marketable profession** as there was a worldwide demand for them.

“You will be working with very modern and sophisticated machinery while dealing with new problems and challenges everyday,” he said.

The diploma will incorporate the European Aviation Safety Agency (EASA) Part 66 Category B1-1 syllabus, which will earn them an EASA Part 66 Category B1-1 **aircraft maintenance license** that will allow graduates to seek immediate employment internationally.

This is the worldwide standard that is adopted by many countries around the world

## [IATA rings warning bell on air-training crisis](#)

**Lower standards, more accidents involving human factors worrying signs**

Air Canada A340 Capt. Brian Angus (left) puts Province reporter Jim Jamieson through his paces in a flight simulator at the crew-training centre at YVR.



LONDON -- Training of pilots **needs to be changed** to combat an impending shortage of qualified fliers and improve safety, said the International Air Transport Association, which represents more than 240 airlines.

Airlines may need **17,000 new pilots** each year to keep up with growth in the industry and the retirement of older officers, IATA director-general Giovanni Bisignani said yesterday in a speech to the U.S. Federal Aviation Administration in Washington.

"We are seeing the first signs of **strain** with two worrying tendencies: **lower standards** for training and qualifications, and **human factors** cropping up in more accidents," Bisignani said.

"It's time to ring the warning bell."

While raising the mandatory retirement age for pilots in the U.S. to 65 years from 60 will help mitigate the shortage, governments also need to alter the way they train and qualify recruits, Bisignani said.

"Pilot training has not changed in 60 years. We are still ticking boxes with an emphasis on flight hours," Bisignani said.

"We can produce better pilots **more efficiently** by focusing on real multi-crew working conditions and making better use of simulators."

Bisignani said he wants more governments to adopt the so-called **multi-crew pilot-licensing** program, which allows candidates to train directly as co-pilots. Candidates now generally must accrue a certain number of hours flying solo before they get their licenses.

Europe was the first region to adopt the **multi-crew licensing**, IATA said. China and Australia are in the process of adopting it. The organization will host a database to track the progress of candidates on the program.

## [Oakland Controller Whose Error Resulted in Close Call Was Working Seventh Day in a Row, an FAA Management Violation of Federal Law](#)

The continuing air traffic controller staffing crisis at Oakland Air Route Traffic Control Center (ZOA) resulted in two aircraft **passing dangerously close** over the skies above Northern California earlier this month.





NATCA discovered today that the Federal Aviation Administration is charging the air traffic controller with an **operational error** and is protesting the outrageously **unsafe working conditions** in which this incident occurred. The controller was being forced by the FAA to work his **second overtime shift and seventh straight day of the week**, a violation of federal law.

The aircraft involved were on crossing courses, with one south-bound at 22,000 feet, and the other climbing out of Fresno to the northeast. The controller stopped the departing aircraft at 21,000 feet and then tried to apply "visual separation rules" to allow the departure to continue its climb. The problem was that "visual separation rules" are only authorized below 18,000 feet. This **misapplication** of a rule caused the aircraft to pass dangerously close and well below the required separation minimum for safe operations.

"The problem with this scenario is that the controller involved was working his **seventh day in a row without rest**," said Scott Conde, the Oakland Center facility representative for NATCA. "FAA regulations require that controllers work no more than six days in a row without a full day of rest due to the **fatiguing nature** of their jobs. According to these regulations it is the FAA's responsibility to ensure that these requirements are strictly adhered to in order to avoid this type of a **mistake from fatigue**."

The controller involved started his work week with a **previously assigned overtime shift** and then worked his regular schedule comprised of five days with **rotating shifts** that started at hours throughout the entire range of the day. He was then **called in** on his first day off and assigned a seventh shift that would have seen him working between 11:00am and 7:00pm that night. This combination of rotating shift start times with excessive overtime assignments led to the **mental error** that allowed these aircraft to pass too close to each other.

Said Conde: "These types of **mental errors** will continue to happen as staffing erodes due to retirements and resignations. The FAA needs to step up and accept responsibility for putting the controller in this situation, and it needs to address the imposed working conditions that are driving controllers to retire and resign from the agency in bunches." The number of retirements and resignations from the controller ranks have exceeded 1,600 since the agency imposed work rules on controllers a little over a year ago.

Oakland Center has 167 fully certified controllers on staff, along with a staggering total of 109 developmentals (trainees) that has caused the certification process for controllers to exceed four years on average. NATCA expects that at least a quarter of the developmentals **will not successfully** complete their training and have to leave the facility.

## El Al: freighter landed with 13 tons of fuel on board

Investigation began following claims made by the pilot that **fuel consumption was too high** during the flight

The Israeli Ministry of Transport and El Al Israel Airlines are known to be checking claims that a B747 freighter flying from New York to Tel Aviv was overloaded with 18 tons of freight.



According to aviation sources in Israel due to overloading, fuel consumption was up endangering the flight.

The investigation began following claims made by the pilot that fuel consumption was too high during the flight. Initial checks raised the possibility that due to **human error** the plane was possibly overloaded.

In reply to port2port inquiry El Al, deputy director general for operations, Capt. Lior Yavor, said that the freighter landed with 13 tons of fuel on board which is above the minimum 10 tons of fuel required by safety regulations

## Preliminary NTSB Report Released in Plane Crash Landing

### The report blames an engine oil seal.

Investigators with the National Transportation Safety Board have released their preliminary report on a Randolph County plane crash.

**The NTSB says a faulty engine crankshaft oil seal caused oil to leak out of the engine.**



On Nov. 6, the pilot, Chang Chehsun, 37 was flying from Pittsburgh to Florida when he had to make an emergency landing.

Chehsun landed the plane on a forest service road on Cheat Mountain.

The Piper suffered wing and fuselage damage.

The pilot was not injured.

According to the NTSB, Chehsun is a certified commercial pilot.

The final report will be released at a future date.

## NTSB Issues Recommendation on Batteries

**Evidence indicates** laptop batteries caused a spectacular cargo plane fire at Philadelphia International Airport last year, federal safety investigators said Tuesday, but they said it's not certain.

Based on the fire and other evidence, the National Transportation Safety Board concluded that **lithium batteries** — used in laptops and cell phones — are a potential fire hazard for cargo aircraft.

"This has been kind of a wake-up call," said NTSB Chairman Mark Rosenker. He noted that more **consumer education** may be needed about the proper handling of lithium batteries.

The three crew members on the UPS cargo plane jumped to safety on the tarmac and were treated for minor injuries after the aircraft made an emergency landing around midnight on Feb. 7, 2006. The airplane and most of the cargo were destroyed by the fire, which started as the plane approached Philadelphia.

The blaze was one of several in recent years in which lithium batteries caught fire on aircraft. Rechargeable lithium-ion batteries, sometimes called "secondary" lithium batteries, and nonrechargeable, or "primary" lithium batteries, can present fire hazards because of the **heat they generate** when they are damaged or suffer a short circuit.

**Twelve fires** involving batteries were reported to the Federal Aviation Administration before the Philadelphia fire, and 15 others have been reported since then, NTSB investigator Crystal Thomas told the board. But the NTSB said too many incidents are exempt from reporting requirements and better data is needed.

The board said cargo operators should transport the batteries in **well-marked** fire resistant containers that are accessible to the flight crew in case of an onboard fire.

"Flight crews on cargo only aircraft remain at risk from in-flight fires involving both primary and secondary lithium batteries," the NTSB said.

The NTSB's recommendations are not binding, and it does not have the authority to force other government agencies to follow its decisions.



George Kerchner, executive director of the Portable Rechargeable Battery Association, said many of the NTSB's concerns **are already being addressed** at the international level. He also said there is also heightened awareness among carriers and manufacturers about the need to **properly package** batteries to prevent fires.

In the past two years, defective laptop batteries have been fingered as potential fire hazards. Thomas noted that the Consumer Product Safety Commission has **recalled** millions of laptop batteries because they could catch fire.

In the Philadelphia case, investigators said destruction from the blaze made it difficult to determine a definitive cause, but other hazardous materials were ruled out. The NTSB also noted that the blaze appeared to have **started in containers that contained laptop batteries.**

The crew declared an emergency on approach into Philadelphia. Fire and rescue crews met the four-engine jet, a DC-8 that originated in Atlanta, and spent four hours trying to control the fire.

The NTSB determined that the airport's rescue and **firefighting personnel were unfamiliar with the aircraft door**, and that hurt their ability to get to the fire. The board also said some emergency personnel who responded were **inadequately trained** on the use of a key piece of firefighting equipment.

## **Suspect in Dominican Civil Aeronautics official's murder found in Colombia**

SANTO DOMINGO.- The International Police (Interpol) has located one of the suspects of **murdering** Dominican Civil Aeronautics official Angel Cristopher Martinez in Colombia, said his son, Eric Cristopher this morning.



In a press conference in the Dominican Civil Aeronautics Institute (IDAC) accompanied by his lawyer Johnny Carpio and the director Jose Tomás Perez, Eric Cristopher said in a delegation of the Justice Ministry, the Police and the victim's relatives will travel in the next few days to Colombia, where one of the crime's main suspects has already been located.

Perez said the organization will provide all necessary support to Cristopher Martinez's relatives to clarify the case. He said the IDAC is committed to help the family and the Dominican society to clarify the case, as Christopher Martinez died in the line of duty.

The murder of the senior Dominican Civil Aviation Institute official occurred while the victim was conducting strict inspections of local commuter airlines, and ordered the grounding of some planes for faulty maintenance.

## Dick Rutan Safe After Emergency Landing

Dick Rutan has piloted many challenging flights, including going around the world nonstop in his brother's Voyager aircraft, but this month he had a close call while flying one of the simplest airplanes around -- a Cessna 150.



"It was sudden, catastrophic and inexplicable," Rutan told The Associated Press. A cylinder blew, and "the engine was totally destroyed." Rutan, who was flying by himself from Mojave to Palm Springs to attend a memorial service for a friend, landed safely on a small road near Victorville about 9:30 a.m.

Rutan said he was flying at about 1,000 feet when the engine died -- the AP said it was "fortunate" that he was so close to the ground, but pilots reading the story would likely wish for more altitude when the engine fails.

Rutan has faced plenty of dangerous flights in the past. He ejected from a burning F-100 in Vietnam, parachuted from a disabled balloon, and abandoned an airplane that broke through thin ice and sank at the North Pole. He told the AP he was lucky that he had clear skies and a good landing spot available when the 150's engine blew. "If I had been over the clouds and had to land on a mountain, my chance of surviving would probably be zero," Rutan said.

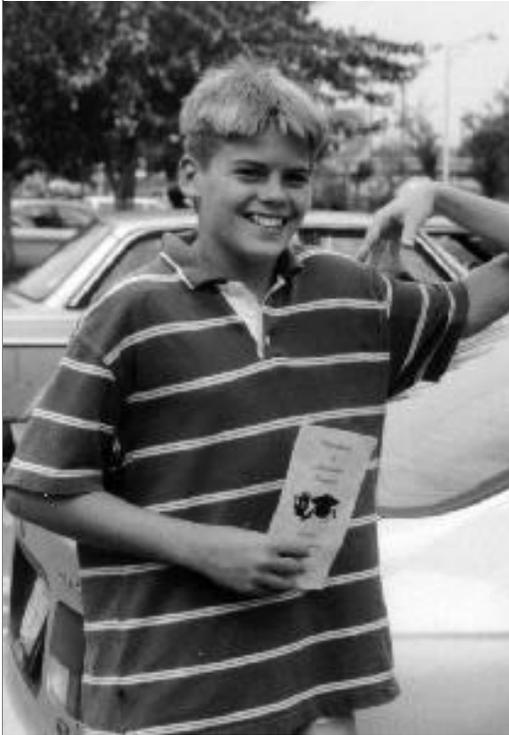
## GA Safety Trend Continues

AOPA's annual Nall Report (PDF) says 2006 was the safest year ever for general aviation operations. According to the report, there were 6.32 accidents for every 100,000 hours flown in 2006 compared to 7.19 in 1997. The report bases its analysis on trends, rather than year-to-year statistics. There's been an increase in the number of weather-related accidents, possibly due to the availability of advanced, high-performance aircraft. Other categories of accidents are generally declining but one thing remains constant. "No matter what accident statistics you look at, pilot decision making continues to be the leading cause of all accidents," Bruce Landsberg, head of AOPA's Air Safety Foundation, said in a release. While pilots are flying more safely, they're also flying less often than five or 10 years ago.



The report shows that there was a slight increase in the number of hours flown in 2006 compared to 2005 but the amount of time we spend in the air has decreased by 5.9 percent since 2002. The foundation encourages pilots to take advantage of the [free resources](#) it provides to improve flight safety.

## Struggled to Stay Awake



# Kevin Mackey

December 23, 1983 -  
September 5, 1998

On September 5, 1998, 14-year old Kevin Mackey was riding his bicycle in his quiet suburban neighborhood in Potomac, Maryland. Without warning, he was struck and killed by a postal worker who was driving home after an 11-hour shift that began at 4:00 a.m. The postal worker admitted that she hadn't slept the day before the accident, and that she was struggling to stay awake behind the wheel.

## Insomniacs Likely to Report a Family History of Sleep Problems

**Insomnia** is the most common sleep complaint among Americans – more than half of adults report at least one symptom of insomnia a few nights a week or more, according to NSF's 2005 *Sleep in America* poll.



"No wonder you have insomnia . . .  
lying there awake all night."

Now a new study finds that people who suffer from current or past insomnia are more likely than good sleepers to have a **family history** of the disorder.

The study was based on the questionnaire and survey responses of 953 adults between the ages of 18 and 83. The researchers who conducted the study found that 39% of those with current or past insomnia had a **first-degree relative** with insomnia, compared with only 29% of good sleepers. They also found that subjects with a family history of insomnia reported greater insomnia severity, anxiety and hyperarousal, suggesting that **genes** may play a role in the disorder. These findings may contribute to the development of insomnia screening techniques and prevention strategies for those who may be predisposed to it, [learn more about insomnia](#), including how to treat and prevent it

## Leading Cause of Turnover: Stress

In a survey of 93 Canadian organizations, consulting firm Watson Wyatt found that it is **stress** that drives most employees **to quit their jobs**, not the prospect of making more money elsewhere. Interestingly the study found a disconnect between why employees actually quit and why employers think they quit. Employers **assume** that the **top five reasons employees leave**, in order of importance, are: dissatisfaction with base pay, career development opportunities, promotion prospects, strained relationships with managers and stress. **In fact**, the tops reasons listed for quitting were: **stress**, lack of work-life balance, dissatisfaction with promotional opportunities, lack of confidence in management, and base pay. (Virginia Galt, "Stress, not money, the leading cause of turnover" Globe and Mail, December 14, 2007)



Turnover is a major problem in many **shiftwork** operations. In fact, according to CIRCADIAN data, the rate of turnover is **nearly three times higher** in **shiftwork** operations than the U.S. average. While there are many approaches a company can take to reduce turnover, a frequently overlooked one is through **designing good shift schedules** that are compatible with human physiology. This can be one of the most effective **counter-measures** to improving employee stress and work-life balance issues.

Shift schedules are crucial to the success of an extended hours operation. They affect not only production, but also employee **safety and wellness**. As testament to this workers who report that they **cope very poorly** with their schedules, are the most likely to quit.

When it comes to designing and implementing schedules, not all methods are equal when it comes to turnover rates. Shiftwork practices data shows that turnover rates are twice as high in facilities that have **management-mandated** schedules compared to facilities where **employees** selected the schedule.

Many facilities make the **mistake** of choosing a schedule based purely on operational requirements with little or no input from the employees. This can create a very contentious environment, leading many schedules to be implemented with a take it or leave it attitude. And as our data shows, many choose to leave it.

## Hard Hats A Good Knight Idea

The medieval knights in their shining armor had the right idea. When saving fair maidens or slaying dragons, they wore fur-lined metal **helmets** to protect their heads.

Things have changed a bit. Our modern day hard hat was invented in 1919 by a Californian manufacturer of safety equipment. Edward D. Bullard patterned his hard hat after the military helmets used during World War I. He apparently had first-hand experience of the effectiveness of the "tin pots" - even with their limited amount of protection.



Bullard's **first version** of a hard hat was made of canvas layered with resin. It was lightweight and sturdy, and it worked. It worked so well in fact, that it became standard equipment during the construction of the Golden Gate Bridge in the early 1930s. Further technical advances have resulted in a lightweight hat with an inner suspension system that is adjustable for comfort.

Yet, **some workers still refuse to wear** their head protection. The excuses range from: "It doesn't look cool" or "It's too heavy" to "It's hot in summer." But excuses can't reverse a **permanent disability** caused by a preventable head injury.

Proper headgear can help prevent injuries caused by falling objects, bumps, burns and overhead chemical spills. It can also shield your scalp from irritating dusts. The right type of headgear can even guard against electrical shocks.

**Let's look at some of the types of head protection available:**

- **Hard shelled safety hats** come in two basic styles. One type has a full brim that completely encircles the hat. It safeguards your head, face, neck, and shoulders.
- The second type of hard-shelled safety hat is similar to a **peaked cap**. It only has a brim in the front to protect your head and face but not your neck or shoulders.

- Safety hats can offer special mounting brackets for ear protectors, front-mounted lanterns, or face shields. Special liners are available to keep your head and ears warm in winter.
- Other types of headgear may include a specially designed cloth cap or hair net to prevent entanglement in moving machinery parts.

Whatever the requirements for your job, make sure you know what type of head protection you require; **then wear it**. A hard hat sitting in your locker or on the front seat of your truck doesn't do anybody any good.

#### Some things you should never do to a safety hat:

- Never carve or paint your name or initials in it. These practices can weaken the protective shell. Instead, wear a color-coded hat if you need to be identified. For example, on-site first aid attendants may want to wear hats of a certain color.
- Never remove the inner suspension system, because it is designed to absorb the force of the blow.
- Never use a safety hat which has received a hard blow, even if it looks undamaged. There could be structural damage, so turn it in to your supervisor for a replacement.
- Don't store your hard hat on the front or back window ledge of your vehicle. Excessive sunlight can rot the harness and straps. A hard hat can also act as a missile during sudden stops.
- Don't store cigarettes or other personal belongings under your hat. They will increase your risk of injury if an object falls on your head.
- Don't drill holes in your hard hat in the belief that you'll feel cooler on a hot day. You won't, and the hard hat won't offer you the protection that you expect.

On the other hand, do keep your **safety hat clean**, free of oils, grease and sweat. At least once a month wash it in warm water and a mild detergent, and then let it air dry.

The knights of yesteryear knew the value of good protection when doing a hard day's work. If your work requires head protection - wear it.

## BY THE NUMBERS: HEAD INJURIES

**Every 15 Seconds:** How often a head injury occurs

**Every 5 Minutes:** How often a fatal or permanently disabling head injury occurs



**More than 2 Million:** How many head injuries occur in the U.S. each year

**Approximately 2,000:** The yearly number of head injuries in which a victim is left in a vegetative state

### And Think About This:

Picture two workers. A bolt is flying at each of their heads at the same speed. Worker B is wearing a helmet with suspension. Worker A is bareheaded.

Worker A's skull is penetrated by the bolt destroying gray matter. He needs **5 to 10 years of intensive care.** Cost: Over \$4 million

Worker B is uninjured. But his helmet is slightly scratched.

## AUDIO SAFETY TALKS!

### YOU'RE NOT HARD-HEADED ENOUGH

We've all met some **hard-headed** people. But how hard is a head, really? In a contest between a falling brick and an unprotected head, which do you think you'd bet on? If "hard-headed" means "pragmatic," then the real hard heads are the workers who always wear their head protection. Encourage your workers to be **hard-headed** and wear their hardhats by presenting this safety talk.

- [To listen to the talk, click this link](#)

## PICTURE THIS!

This photo comes to us with a description of a test you can use to convince anyone who doesn't believe in the necessity of head protection. Take two melons. Strap one into a helmet. Drop both from a height of 12 feet (3.6 meters). Inevitably, says the description, "One will get its brains (sorry—seeds) splattered all over the pavement." And oddly enough it usually seems to be the same one. Guess which?



## Bad Designs

### Don't press any buttons underwater!

An athlete had been trying to get into shape so he could start doing triathlons -- athletic events composed of swimming, cycling and running. He purchased a nice sport watch, a "Triathlon" model, so he could time himself in the pool and confirm he was counting the laps correctly. After just a few workouts, the watch filled up with water! He took it back and they happily replaced it, saying that he must have *accidentally* pushed the buttons under water!



The watch was water resistant to 100 m. He looked at the instruction booklet that came with the watch. On the last page of the instructions was printed...

*WARNING: TO MAINTAIN WATER-RESISTANCE, DO NOT PRESS ANY BUTTONS UNDER WATER*

This limitation seemed ridiculous since using the watch to keep track of laps in the pool would involve pressing buttons on the watch while swimming.

### Design Suggestion

The athlete is likely to press the watch buttons underwater because the warning isn't obvious. If a warning sticker was placed on the watch, it would be more obvious.

Of course, a better solution would be to design the watch to allow the buttons to be pressed while swimming, without ruining the watch. Some other brands of watches allow this.

