



Aviation Human Factors Industry News

June 31, 2008

Vol. IV. Issue 25

Maintenance industry needs professional standards

By John Goglia

June 1, 2008

Aviation International News

Training, Maintenance and Modifications

Almost everywhere I go, the subject of mechanics being **recognized as professionals** filters into the conversation. Often there is a mild tone of bitterness, as people lament the fact that mechanics are somehow not considered professionals. What decides whether a trade or skill is considered a profession? According to one measurement, if a third party pays you for your knowledge and ability you are a professional. If you pass a test administered by a **recognized organization, you are considered a professional. Aircraft mechanics meet both of these standards.**



Two types of professional-certified public accountants and registered nurses—operate within a structure similar to that occupied by aircraft mechanics. In both cases, participants must pass a test administered by a government agency after completing the required education. They must also receive recurrent training. Certified public accountants, for example, are required to prove they have undergone 40 hours of training every two years. Most aircraft mechanics receive this amount of training, so I don't see this as a difficult task to accomplish.

In almost every discussion about this subject, someone points out that the U.S. government classifies an **aircraft mechanic as semi-skilled**. At one time that was true, but the U.S. government **stopped classifying employee groups** in the mid-1980s and these classifications are no longer used or maintained.

In about 1996, while I was an NTSB member, I researched these classifications within government in an effort to correct the semi-skilled label assigned to aircraft mechanics. After much effort, I discovered that the “semi-skilled” designation was used within the Department of Commerce. I was told that I was the first person to inquire about these determinations in many years.

Ten years have passed and there are still some who use this long retired reference to the “semi-skilled mechanic.” The only other place that classifies aircraft mechanics is the Department of Labor, which groups aircraft mechanics with elevator repairmen and installers. It is not exactly a great fit, but at least the elevator repairman earns as much as or more than most aircraft mechanics. I attempted to change that job classification but I was unsuccessful.

One concern I have about trying to reach the goal of being recognized as a professional is our lack of a clearly stated and widely accepted set of professional standards. The other professional groups have published a set of standards that include professional ethics. Some of our associations have made an effort to establish professional standards, but their work has not been widely accepted by either the aircraft maintenance industry or the average aircraft mechanic.

The Professional Aircraft Maintenance Association (PAMA) has continued that effort with some success, but the road is long and rocky. It hasn't helped our cause that so many of the associations that represent mechanics are pulling in different directions. PAMA has been working with SAE International to develop a set of professional standards to verify that we have the skills, knowledge and ability to accomplish certain complex tasks. I have been told that they are well into a composite repair standard.

Having standards for aircraft maintenance residing within a globally recognized engineering organization such as SAE International is a major coup, and it helps that virtually all of the engineers who provide the design and specify the maintenance process are members of SAE International. It will take some time to build all the advanced standards required to represent the areas of expertise used by today's aircraft mechanic. However, we will accomplish this task one step at a time.

One element of a set of professional standards is a requirement to follow the laws of the governing country as well as the professional rules that have been established. To you and me, that means following the FARs and the appropriate maintenance manuals. If you have been following the news about our industry lately, you realize that some in aircraft maintenance are having a problem with staying within the law. Government employees have been accused of violating government ethics rules; since they are aircraft mechanics, we are all tainted by their actions.

We have also seen indications that some aircraft mechanics **have had a problem complying with the published procedures.** While it might be some time before we know the truth around these published reports, the general public might have already labeled aircraft mechanics **not trustworthy.** Due to the high level of press coverage of these events, it might be a while before public opinion about maintenance swings back towards the positive side.

From what **many of the proud working aircraft mechanics** have been telling me, I believe it's time we started working on the issue of **professionalism** in the near term. This will certainly require both the individual aircraft mechanic as well as the industry to establish a meaningful set of **professional standards that includes professional ethics.**

U.S. Navy Maintenance Mishap Summary

If I had a nickel for every time I saw **"CAUSE OF MISHAP OR DEFICIENCY: HUMAN ERROR"** I would be a rich Chief. I could stop playing the lottery. I could burn my paycheck because I would have so much money. If that were the case I would also say, keep it up people, I'm rolling in the dough. **Those checklists and maintenance manuals are for suckers. We don't need no stinking checklists.**



It appears that some have already taken this ill advice. We **assume** that it was done by someone else. Just because we think someone else took care of it does **not relieve us of the responsibility** of making sure that it was accomplished. I am not sure about you all, but I never enjoyed telling the Commanding Officer or Maintenance Officer that **I screwed up.** Luckily it has not happened too often in my career. How many times will it happen in yours?

If you are scratching your heads wondering what in the world is the Chief talking about, here is what happened. I will give you the punch line first. The cartridge actuated devices (CADS) worked as advertised. I normally think that this is a good thing, but it is not a good thing if you did not intend for them to fire. Our F/A-18E was out on a bombing mission and had to divert to NAS Fallon, NV for hung ordnance. The aircraft was downloaded and made safe to return to base. Upon arrival an ordnance team prepared to do a release and control check to see if they could figure out why they had hung ordnance. **Step 4 in the references for release and control checks states "ALL CARTRIDGE RETAINERS AND CAPS REMOVED; CARTRIDGES REMOVED".** Take a wild guess and try to figure out which **step they missed.** Go on, talk amongst yourselves if you have to. Subsequently, stations 3 and 9 were still armed with two CCU-45 and one MK-19 cartridges each.

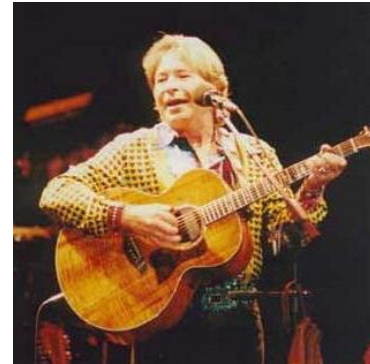
During jettison checks emergency jettison was pressed and the CCU-45's were initiated, working as advertised. "The reputation of a thousand years may be determined by the conduct of one hour." Chinese Proverb

Ten Most Tragic Celebrity Air Accidents

While air travel remains remarkably safe, more than a few celebrities lost their lives aboard doomed flights. Here are the top ten most tragic aviation crashes involving celebrities.

10. John Denver – October 12, 1997

Country music singer John Denver died when his experimental EZ Lite aircraft crashed just off the Monterey coast, in California. An experienced pilot, Denver was type rated for multi-engine and Learjet aircraft. Witnesses saw the ultra light dip suddenly into a nose dive into the ocean, leading some to speculate that Denver may have **inadvertently** knocked the side stick control while reaching around into the rear of the aircraft to operate the fuel selector valve after running out of fuel in one of the tanks.



9. Payne Stewart – October 25, 1999

The knickerbockers and tam o'shanter favoring American golfer was fresh off of his third Major championship win at the US Open at Pinehurst, when **tragedy struck** in the fall of 1999. For reasons still not completely understood, Stewart's Learjet gradually lost cabin pressure while flying from Orlando to Dallas. For hours the plane continued to fly on autopilot, trailed by bemused F-16s before finally crashing in South Dakota once it ran out of fuel.



8. Otis Redding – December 10, 1967

Soul singer Otis Redding was **only 26** when he died along with his manager and back up band, after his plane plunged into Lake Monona in Madison Wisconsin. The exact cause of the crash was never determined, though one of the surviving band members, who had been napping just before the plane went down, remembers his one of his colleague screaming out "Oh no!," just before impact.



7. Paul Wellstone – October 25, 1999

The liberal icon and long time senator from Minnesota died, **along with his wife and one of his children**, when their chartered Beechcraft King Air A 100 crashed shortly after take off outside Evelyth, Minnesota. While the weather conditions included freezing rain and snow, the NTSB report puts most of the blame on the crew. The pilot and co-pilot each had below average records.



6. Aaliyah – August 25, 2001

Just 22 years old at the time of her death, Aaliyah had already established herself as a leading R&B star when her twin engine Cessna 402B crashed just after take off from Marsh Harbour, Abaco Island, Bahamas, where she had been filming a music video. Investigations uncovered that the pilot had not received a type certification for the aircraft, and the plane had been **significantly overloaded**. With so much of the weight loaded at the rear of the aircraft, the plane nosed upwards and into a stall.



5. John F. Kennedy, Jr.- July 16, 1999

John F. Kennedy, Jr., son of the 35th president, died along with his wife Carolyn Bessette when their plane crashed into the Atlantic en route to Martha's Vineyard. Kennedy was piloting his Piper Saratoga II HP on a dark and hazy night when the crash occurred. It is believed that Kennedy, who **had not yet been qualified** for instrument flight rules conditions, was likely disoriented by the conditions.



4. Lynyrd Skynyrd – October 20, 1977

Shortly after beginning what was set to be the southern rock group's largest tour, the band's chartered Convair 240 developed **mechanical problems** en route from Greenville, South Carolina to Baton Rouge, Louisiana. While attempting an emergency landing at a small air strip, the plane crashed into a forest.



Lead singer and songwriter Ronnie Van Zant, guitarist and vocalist Steve Gaines, and back-up vocalist Cassie Gaines, and assistant road manager Dean Kilpatrick, died in the crash, along with the plane's pilot and co-pilot. Most of the other band members suffered serious injuries.

3. Stevie Ray Vaughn – August 27, 1990

Hard living blues guitarist Stevie Ray Vaughn had begun to experience a taste of mainstream exposure when **tragedy struck**. After finishing up his set at a show in East Troy, Wisconsin, Vaughn hitched a ride aboard one of the helicopters Eric Clapton (also performing that night) had chartered for his band. The helicopter crashed less than a mile from where it took off, killing all on board. Pilot error is believed to be the cause of the crash.



2. Roberto Clemente – December 31, 1972

When big league slugger and humanitarian learned the supplies he was sending to the victims of a massive earthquake in Nicaragua were being interdicted by corrupt officials of the Somoza regime, he decided to take matters into his own hands by personally escorting an aid package. The plane he chartered sadly had a history of **mechanical problems**, and was overloaded by 5,000 pounds, and crashed into the ocean off the coast of Puerto Rico.



1. Buddy Holly, Big Bopper, and Ritchie Valens – February 3, 1959

They call it “**The Day The Music Died**”, when a small plane carrying three legends of early American rock and roll- Buddy Holly, the Big Bopper, and Ritchie Valens- crashed into an Iowa cornfield. To this day, the exact causes of the crash remain unknown, but it is believed to have been the result of a combination of poor weather conditions and pilot error.



FAA Situational Awareness Through Airfield Signs & Air Traffic Control Instructions

This FAA animation allows pilots/technicians to assess their knowledge of some of the airfield markings and signs, as well as air traffic control instructions that they may encounter while taxing.



[Click here to take the quiz.](#)



Staying safe on the job

Injuries on the job can cost more than you think. Employees can suffer life long injuries and lose money during their time off to recuperate. Companies lose money and lost work time.

In Colorado last year, there were more fatal accidents on the job than the national average. Today Grand Junction Mayor Gregg Palmer proclaimed June National Safety Awareness Month.



In the this months recent construction site crane accidents in New York, Kansas City, and Iowa killed four people. Here on the Western Slope some city officials are stepping up their commitment to public safety.

"This is an opportunity for us to remind not only ourselves, but other employers how important it is to have worker safety, not only for the productivity but simply for the safety of the employer and employees," said Mayor Gregg Palmer.

Pinnacol Assurance is the largest provider of workers' compensation insurance in the state. It teamed up with the mayor to lower job site injuries.

"We encourage all employers to look at safety as a very serious issue in the workplace," said Palmer.

One worker injury can mean big losses for a company-- from worker compensation to loss of productivity and hiring expenses.

"The average cost to Pinnacol policy holders for a single on-the-job injury is \$4,600. The average lost time from work is 57.7 days," said Marcia Benshoof of Pinnacol Assurance.

Workers at West Star Aviation **repair planes** using heavy equipment in precarious locations. The company has turned its safety record around. Employees now use **state of the art fall protection equipment** protecting workers more than 30 feet off the ground.

Palmer says the city has very few accidents, but when a worker gets injured on the job, they scrutinize what went wrong so they'll do better next time.

[FAA Honors Alaska Airlines With Seventh Consecutive Diamond Award for Maintenance Training Excellence](#)

Alaska Airlines has received its **seventh consecutive Diamond Award for maintenance training excellence** from the Federal Aviation Administration (FAA). This is the fifth consecutive year Alaska received the award with the distinction of Special Recognition, an honor given only when all eligible employees participate in the Aviation Maintenance Technician Awards (AMT) program.



The FAA also presented Alaska Airlines with a special award to recognize its five-year record of **100-percent participation** in the AMT program.

"This award underscores our commitment to the **core values of safety and compliance,**" said Fred Mohr, Alaska Airlines' vice president of maintenance and engineering. "In order to achieve this commitment and be at the top of our game, we make a daily investment in the **training and technical excellence** of our technicians. I am so proud of everything we do to ensure the safety and compliance of our airline. In my opinion, we have the best technicians in the industry."

The FAA also honored 724 Alaska Airlines employees with individual AMT Awards. Seattle Avionics Technician Trainer Neil Fonda and Avionics Technician James Anderson received the highest honor -- **the Diamond Award** -- for completing more than 100 hours of training in 2007.

The Aviation Maintenance Technician Awards program began in 1991. Its purpose is to provide incentives for aviation maintenance technicians **to participate actively in initial and recurrent training programs,** either on their own or in programs subsidized by their employer.

5191 Investigation In Question

The air traffic controllers' union is urging a federal safety board to reopen its findings on a 2006 plane crash in Kentucky that killed 49 people and **include understaffing at the airport tower as a contributing factor**, the Louisville Courier-Journal reported Saturday.



In a petition filed with the National Transportation Safety Board, the National Air Traffic Controllers Association says **having two controllers on duty** would have presented a better chance at stopping the plane from **using the wrong runway** at the Lexington airport, according to The Courier-Journal of Louisville. The tower had one controller on duty at the time of the crash.

"Had there been two people there, I seriously believe the accident wouldn't have happened," NATCA President Patrick Forrey told the newspaper.

NTSB spokesman Terry Williams said the **board would review the petition and comment afterward**.

In issuing its finding on the Comair crash, the NTSB did not cite understaffing as a contributing factor to the crash. The board said **"it cannot be determined if this decision contributed to the circumstances of this accident."**

Comair Flight 5191 crashed the morning of Aug. 27, 2006, after trying to take off from a runway that was too short. The plane clipped a perimeter fence and trees before crashing on a farm less than a mile from the airport, killing 49 of the 50 people on board.

The NTSB later found that the pilots' **failure to spot clues alerting them of taxiing to the wrong runway and not double-checking instruments to verify their location** caused the crash.

Investigators also noted that **having one controller on duty at the time** of the crash was contrary to a Federal Aviation Administration policy requiring two controllers on the midnight shift.

The lone controller told the NTSB he had turned away from the plane after clearing it for takeoff to attend to administrative duties.

The union also has sent a letter to the NTSB complaining that nearly two years after the crash, the controllers and the FAA have had just **one meeting to address fatigue problems**, the newspaper said.

One of the NTSB's recommendations after the Kentucky crash reiterated the board's previous urgings that the FAA **deals with controller fatigue**.

The petition and the letter, both obtained by The Courier-Journal, come as the House Transportation and Infrastructure Committee's aviation subcommittee holds a hearing on air traffic controller staffing Wednesday.

In their findings, the **NTSB and the FAA maintained that a second controller would not have made a difference** because that controller would have been monitoring radar in a room downstairs, not in the tower.

The union said that finding contradicts the NTSB's own interview with a Lexington controller who said two controllers working the midnight shift normally worked together in the tower.

"NATCA asserts that had two controllers been on duty that morning, the lone controller would not have been engaged in radar activities and **would have had a better chance at stopping** Comair 5191 from rolling down the wrong runway," the union's petition said.

The petition said the board "has simply closed its eyes" to the direct connection between the FAA's failure to meet staffing requirements at Lexington and the crash.

FAA spokeswoman Laura Brown said she did not want to comment directly on a petition sent to the NTSB, but her **agency has never had a policy requiring two controllers to be working side-by-side in the tower**.

The FAA required, when there were two controllers on the shift, that one work in the tower and the other on the radar, which may mean **working downstairs, in a windowless room**, she said.

"It's up to the NTSB to decide what the contributing factors are, but (NATCA is) implying there was a requirement to have two controllers in the tower, and that was not the requirement," Brown said.

Keeping Aviation Material Flying

Dozens of commercial and military engine shops around the world are signing up for **GE Aviation's** free engine scrap reclamation project. Given the emphasis on safety, cost containment and environmental improvement in the aviation industry, what's not to like about this **recycling program** that does everything from start to finish -- and pays the engine shop for the alloys?



GE sets up recycling bins at a customer's facility, transports the scrap, cleans the contaminants and sends the material to a melting source, which then supplies it as useable material. The whole process **is free to the customer**, who gets paid for the material. And let's face it, how many airlines and MROs declare one of their core competencies is handling scrap material?

Some customers have stockpiled scrap material because they didn't know how to dispose it properly and they did not want it ending up on the blackmarket, said Larry Deming, program leader for GE Aviation's reclamation and recycling program. The recycling program **decreases liability by "guaranteeing that material will never see life again in its current condition.** It will be taken care of, completely mutilated, and remelted down and cast back into a new casting" or billet form for future use.

Recycling program participants also gain a safety quotient, because **mechanics aren't cutting hardware**, which can be hard, dangerous work involving torches. **Maintainers can maintain aircraft instead of destroying parts, which translates to a more efficient workforce**, too.

GE started the program at its own engine service shops last year, focusing on recycling rhenium, which is a byproduct of copper (it takes about 120 metric tons of copper ore to produce one ounce of rhenium, according to GE). Rhenium primarily is used in the hot section of GE engines -- in high-pressure turbine blades, turbine airfoils, vanes and shrouds.

GE service centers last year "were able to reclaim 20,000 lbs. of HPT alloy, which contained rhenium. This year, we are going out for a 10X improvement on that," which "would allow us to reduce our rhenium need by approximately 10% this year," said Deming

After processing and cleaning a high-pressure turbine airfoil, there's a slight loss of material, but "you probably get about 85% to 90% of that original blade or vane back into the material stream," said Deming.

After last year's internal work, "we came up with a process whereby we can take this scrap material, which would normally be scrapped and sold off to commercial industries like the stainless steel industry, which would be after this material for its high nickel content," said Deming.

The recycling program, launched to the industry in March, **keeps material in the aviation industry** and "guarantees material streams so that customers can continue to have the hardware that they are going to need to keep their aircraft in the air," said Deming.

GE and its melting sources are fine tuning the recovery process to include other metals, such as nickel, titanium and cobalt, which are widely used in the aviation industry. "Some alloys are OEM specific, so we'll even be helping our competition by giving some of their alloys back to them," said Deming.

He stressed that this strategic material, including Inconel 718 used by most OEMs, is critical for the aviation industry. "Down the road, we know there will be more shortages, more volatility in the metals markets," he added.

He hopes to **reclaim at least 100,000 lbs. of each metal annually.**

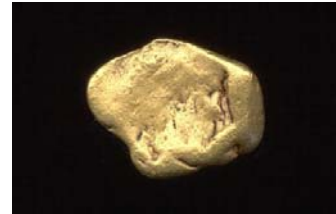
"My goal is to recycle at least 60% to 70% of the engine, and by the end of the year, we should make that target," said Deming.

Recycling program customers and potential customers span the world and include Turkish Technic, Lufthansa Technik, Atlantic Southeast Airlines, China Airlines, Egat, Standard Aero, Air Canada, Air France, TAP, Air India, Iberia, Alitalia, Finnair and MTU. Several other commercial and military customers are interested in the program, too.

"There is a **finite amount of these elements** in the earth's crust," so this reclamation program helps the environment and saves customers money, said Deming. "If it is aviation related, we are willing to work with other OEMs to help keep this critical aviation material in the aviation industry."

Midnight Shift Nugget

Foods That Fight Slumps



When the **midnight shift blahs** leave us slumped over our work like an unwatered houseplant, most of us reach for a supersized **vat of coffee and/or a calorie-packed sugar snack**. There are much better options, whether you need a quick lift to keep you from nodding off in a meeting or something to keep you going for hours.

WATER: Sometimes what feels like fatigue is just dehydration (often made worse by too much coffee). Drink 8 ounces of water, take a quick walk around the block or the parking lot (fresh air is an energy booster, too), and then down another 8 ounces when you get back.

WATERMELON: Like cookies and candy, watermelon is high in sugar, which metabolizes quickly, which gives you a rush. But watermelon's way healthier: Instead of guilt, you get fiber, a hit of vitamins A and C, plus all that fresh, juicy flavor for almost no calories (fewer than 50 a cup). To make your new zip last longer, eat it with some protein and a little fat -- as in low-fat cottage cheese or a fistful of sunflower seeds.

BRAZIL NUTS: They're off the charts in mood-lifting selenium and strong in fatigue-fighting magnesium. Just six of these nuts give you 4 grams of protein and some healthy plant fats, a combo that will keep you going far longer than you'd think.

A MEXICAN BAKED POTATO: Spuds are high on the glycemic index -- that is, they give blood sugar a quick boost -- which is bad for people with diabetes but good in moderate doses for other people in need of an energy surge. Heap on some salsa and top with a dollop of low-fat sour cream to enhance the effect. Spicy foods are stimulating, and hot peppers wake up more than your taste buds.

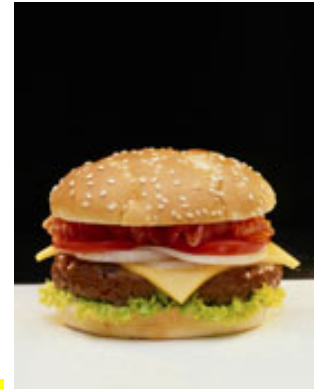
A FEW DRIED DATES: They were traditionally used in the Sahara to provide quick energy to camels. Like potatoes, dates are a high glycemic snack, but rich in minerals, too -- especially potassium. Split the dates and fill with a tad of low-fat cream cheese to slow the sugar absorption.

PB&J ON WHOLE WHEAT: The all-American sandwich is also an all-around pick-me-up, thanks to its amazingly complete mix of carbs, good fats, protein, and whole-grain fiber. Just make it a one-slice fold-over to cut the calories down to about 200.

Sleep Restrictions Lead to Increased Consumption of Calories from Snacks

Restricting bedtimes to **five and a half hours** in an environment that **promotes overeating and inactivity** can be tied with an increased intake of calories from snacks, according to a study presented at Sleep 2008, the annual meeting of the Associated Professional Sleep Societies.

The study followed 11 healthy volunteers split into two groups, one restricted to five and a half hour bedtimes and the other eight and a half. According to an [article](#) in *Medical News Today*, the behavior found in the group with the shorter bedtime restrictions **might contribute to the increased risk of weight gain and obesity** associated with short sleep hours.



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FAA Examines Cockpit Fatigue And Finds ...

The FAA brought together 325 experts last week to spend three days discussing the **problem of fatigue** in aviation operations, and the agency says the symposium produced agreement on two major points -- **fatigue is a problem**, and **something should be done about it**. No, we're not kidding -- that's from the **FAA news release**. "The FAA hopes the participating individuals and organizations will use the information and concepts shared during the symposium as a springboard to develop **effective fatigue management strategies**," the agency says. We're not sure what those strategies might be (dogs in the cockpit?), but reading the FAA's news release is probably not one of them. So in the interest of battling fatigue, we'll summarize. "Many experts consider the key to addressing the problem [to be] **scientifically based fatigue risk management systems**," the FAA says. Those guiding scientific principles should be developed through "enhanced data collection." Just to keep us off-balance (and alert), the FAA turned up one useful suggestion -- it was noted that employees who excuse themselves from duty due to fatigue should not be penalized.



"The conferees recognized that incorporating **fatigue risk-management** systems into everyday operations is the ultimate goal, but doing so will take innovation in addressing a myriad of regulatory issues," the FAA concluded, and we hope you stayed awake till the end of that sentence.

Aviation Icon John Miller Dies

A lifelong pilot who was inspired by a young Glenn Curtiss, **watched Lindbergh** take off from Long Island and held a current instrument rating until he was at least 96 years old, died peacefully in a Poughkeepsie, N.Y., hospital on Sunday. John Miller **was 102**. As he told *AVweb* in a **2002 interview**, he saw his first airplane when Curtiss landed in a nearby field on his way to claiming a \$10,000 prize for flying from Albany to New York City. Miller was smitten from the age of four and taught himself to fly in a barnstormer's discarded ride plane when he was 18. He liked to say his flying career covered "**Jennys to jets**" and there was a lot of ground in between.



While he flew everything from mail airplanes to commercial airliners and was a military test pilot, Miller was perhaps best-known for his work with autogyros. In later years, he flew himself around the country in his beloved Bonanza and when we talked to him at EAA AirVenture in Oshkosh in 2002 he was getting ready to fly home. Flying was never far from his mind, even in his last days.

Two days before he died of natural causes, he told his grandson Robin Moore, "I guess my flying days are over." He donated his body to science and there will be no public funeral, at his request.

FACT CHECK

In 2006, one worker was **injured** on the job **every nine seconds**.

Source: National Safety Council, "Injury Facts," 2008.



FACT CHECK

Excessive speed was a factor in **31 percent** of all traffic **fatalities** in 2006.

Source: National Safety Council, "Injury Facts," 2008



SUMMER SAFETY

Hot Tips for the BBQ

According to the US Fire Administration, every year BBQ grills cause approximately 6,500 **fires**. The peak month for grill fires? July.

The top ignition factor, accounting for 43% of grill **fires**, is mechanical failure or malfunction, such as part failure, leak, break or lack of maintenance. Other ignition factors include:



- **Misuse of heat of ignition** - such as lack of control of open **fire** and abandoned materials
- **Misuse of material ignited** - such as combustible material being too close to heat
- **Operating deficiency** - primarily leaving the grill unattended

With proper maintenance, inspection and vigilance, however, many outdoor grill **fires** can be prevented. Here are some top BBQ do's and don'ts:

Do

- Operate BBQ outdoors only, 10 feet from house, garage and trees;
- Maintain your BBQ by replacing rusted or worn hoses and fittings;
- Test for leaks and check tubes for blockage;
- Keep lid open when lighting gas grill, to prevent flash off from gas build-up;
- Turn BBQ off if you smell gas and don't attempt to relight until the leak is fixed;
- Keep alcohol away from grills;
- Use baking soda on grease fires - not water - and keep the proper **fire** extinguisher handy;
- Cap lighter fluid immediately and place it a safe distance from the grill.

Don't

- Leave an operating barbecue unattended;
- Move an operating BBQ;
- Wear loose or flowing clothing while tending to the BBQ;
- Use gasoline or kerosene as a starter;
- Store LP cylinders indoors;
- Store spare cylinders near the grill or appliances.

In case of **fire**:

- For propane grills - turn off the burner
- For charcoal grills - close the lid
- For electric grills - turn off power
- If the **fire** involves a propane tank:
 - Leave it,
 - Evacuate the area, and
 - Call the fire department immediately (911).

SAFETY FOCUS

DO's & DON'Ts FOR GAS REGULATORS

GENERAL PRECAUTIONS

Oxygen under pressure and hydrocarbons (oil and grease) can react violently, resulting in explosions, fire, and injury to personnel and damage to property. Never allow oil or grease to come into contact with oxygen under pressure. Even a small amount of hydrocarbon can be hazardous in the presence of high oxygen concentrations. In fact, any organic matter in contact with oxygen under pressure could have a violent reaction.

INSTALLATION PRECAUTIONS

- DO** Maintain the pressure element assembly and connection free from dirt and any grease or grime.
- DO** Follow the manufacturer's instruction manual for the correct pressure ranges to be used and for proper care and storage.
- DO** Use the proper size wrench to secure the gauge to the regulator.
- DO** Use only the thread sealant recommended by the manufacturer.
- DO** Leak test the gas outlet connection using soap solution prior to use.
- DO NOT** Touch Oxygen regulators or cylinder heads with hands or gloves that are contaminated with oil grease, grime or any organic material. An explosion could result.
- DO NOT** Install a low pressure gauge into the high-pressure port on a regulator. Always double check.
- DO NOT** Use gauges designed for a specific gas for a different gas. **E.G. Never use an oxygen gauge for acetylene. From one gas application to another.**
- DO NOT** Exchange gauges from one regulator to another.
- DO NOT** Remove the restrictor installed in the gauge connection. The restrictor limits gas flow and aids in limiting temperature rise due to adiabatic compression.
- DO NOT** Use or handle gas regulators unless you are authorized and qualified to do so.

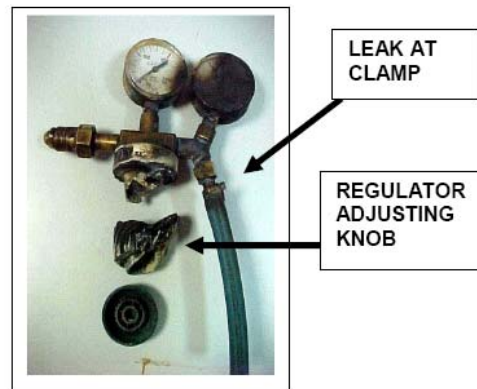
OPERATING PRECAUTIONS

Gauges can fail during operation and the energy contained in the compressed gases can produce violent effects should the pressure element assembly rupture.

- DO** Always apply cylinder pressure slowly. The gas may heat up due to compression and ignite. This is called adiabatic compression.
- DO** Stand with the cylinder between you and the regulator when turning on the gas cylinder. This will reduce the possibility of injury from flying parts should pressure element assembly rupture.
- DO** Use good judgment and common sense. Know the hazards of the materials you work with.
- DO NOT** Use clamps or substitute materials that are not approved by the regulator manufacturer.



Example of oil in contact with oxygen under pressure. This worker, employed by a construction contractor in Nigeria, had oil on his left hand while adjusting the pressure on an oxygen regulator. There was an oxygen leak at the hose clamp.



PICTURE THIS!

This isn't a hazard everyone's going to run across, but it must be fairly common in some places—certainly common enough that the person pictured here feels confident in his ability to handle the situation without any kind of PPE. He probably would have been a lot safer if he'd simply waited for the appropriate authorities to arrive and take care of the hazard, rather than **risking his own life and limbs.** **And make no mistake, he's risking his life.**

