



A member of the SGS Group

FIXED WING NEWSLETTER

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SAFETYWIRE



Tools of the Trade

Page 1

**Heat Injuries—
Don't Let Them
Sneak Up On You**

Page 5

**Safety Managers
Corner: The Publish
Function**

Page 10



Tools of the Trade

(Source: NASA's Callback newsletter May 2022)

If you have ever stepped back and considered the nose to tail complexity of the airliner you are about to board or perhaps peered beneath the cowling of a small aircraft or down the nacelle of a turbine engine, you've glimpsed the intricacies that Aviation Maintenance Technicians (AMT) diagnose, service and repair daily. The tools and equipment needed to do this work can be highly specialized, but also as simple as a screwdriver.

While having the right tool for the task at hand is critical, AMTs also need an array of specialized training, qualifications and skills, along with experience and an occasional burst of ingenuity for mission success.

Calibration of tools is another vital cog in the AMT's work routine. From machining to torque wrenches, many tools require regular calibration to ensure work is done accurately and in accordance with documented procedures.

This issue of *CALLBACK* presents AMT perspectives of the use and occasional challenges of tools on the job. Enjoy the insights and let your interest be piqued to learn more about this instrumental aspect of aviation.

Hydraulics Unblocked

Lack of the right tool and confusion with a task card led a Technician crew to use alternate means to accomplish a hydraulics flush. The resolution revealed a need for proper tooling and procedures.

- ◆ Aircraft X had a log [write up] to flush blue system hydraulics due to contaminated hydraulic fluid. The procedure in the AMM [Aircraft Maintenance Manual] called out for a tool [hydraulic fluid purification system] to purify the hydraulic fluid which [our] company didn't have. The mechanics were then told to follow the AMM until they came to a "roadblock" and then figure



it out from there. Eventually they used the Hydraulic Mule, which got contaminated, and figured out a way to flush it through the RAT (Ram Air Turbine) system. Capturing the contaminated fluid became another issue as no one could determine at what pressure this fluid would exit the line.... There was no procedure in place for this task. No one could give guidance on what pressure to dial into the Mule in order to get the fluid pushed out.... Whoever wrote the task card should have ensured there was a viable AMM or procedure to accomplish this task and that the correct tooling was in place.

Gauging the Right Mix

A Technician discovered oxygen and hydraulic fluid gauges together in the same drawer. Concern was voiced about the potentially volatile mix.

- ◆ I went to retrieve a pressure gauge for the Aircraft X oxygen system and went into supply. The drawer I opened was in location cabinet XYZ for the pressure gauge. I found the gauge I needed and when I went to close the drawer, I saw another gauge there that is used for the hydraulic reservoir cap with gauge attached in the same location as a gauge we use for oxygen. This is a major safety concern with petroleum products like hydraulic fluid being near oxygen tooling and equipment can cause combustion in the right conditions. The oxygen equipment needs to be segregated from ANY hydraulic or petroleum product at all times.



Lost and Found

After discovering a tool left in the aircraft engine, this Technician proposed some preventive steps to avoid inadvertent misplacement or loss of tooling.



- ◆ While performing an inspection of the #2 engine VG (variable geometry) actuating system on Aircraft X, I found a screwdriver resting under the W1 harness. Upon discovery of this I removed the tool, inspected the area for damage, and brought the tool to my Supervisor. No damage was done to the harness, tubes, brackets, or components however it had the potential to become a serious issue. I suggest the following to help prevent any events in the future: Work areas such as engines, wheel wells, hydraulics bays should not be used to set tools in as a tray. Always account for the tooling used on the job after work is complete. Do a final inspection of the area that was worked in for FOD (foreign object debris/ damage) or tools before you close the panel or engine.

Calibration Chain Reaction

This Rotorcraft Technician's inspection yielded results within limits, but with a tool out of calibration. Late discovery of this fact resulted in the helicopter being taken out of service and the inspection performed again.

- ◆ [There was] planned scheduled maintenance for...Main Rotor Hub and Blade Assembly inspection. [I] installed ...[the] vibration analyzer tool and proceeded with the inspection. Track and balance was well

within limits after the first maintenance flight and no adjustments were needed or done. The vibration analyzer tool was then removed, inspection signed off in logbook and aircraft returned to service.... Later I was told to send the vibration analyzer tool to another base and...noticed the vibration analyzer I have received was overdue for calibration. I notified my...Director and informed him the situation and was then told to take the aircraft out of service until an up-to-date calibrated vibration analyzer tool was received and the... inspection was re-performed. The next day, a calibrated vibration analyzer tool was received and the inspection was re-performed and signed off in the logbook, and aircraft returned to service.



Special tools being received at the base should be reviewed for proper tool calibration certificate, decals and overall condition. Also, Tool Department and/or personnel shipping out special tools should be aware of its calibration date and overall condition before physically shipping tool out.

Pressure Loss, Silent Let Down

A Technician team using a pressure gauge to complete a landing gear weight on wheels check noticed mid-task that the aircraft had settled onto a ladder. Air escaping unnoticed from the tooling was suspected as the culprit.



◆ Aircraft X required a weight on wheels...check of the Nose Landing Gear and Right Main Landing Gear. We centered the ladder in between the Nose Landing Gear Doors and I began to install the pressure gauge to the top fitting on the Nose Landing Gear Strut. While doing so the ladder must have shifted positions. During this time, I never heard any loud hissing to indicate to me that air was being released due to extreme noise from our aircraft and other aircraft and vehicles in the vicinity. My partner went up to turn off the aircraft power due to the noise level. A few minutes after coming down from the ladder I noticed the left Nose Landing Gear Door sitting on top of the ladder. I immediately moved the ladder to

prevent any further damage. I suspect that air escaped from the t-handle on top of the tooling and due to the noise, I wasn't able to hear it. The very slow release of air may have caused us to not notice the plane had shifted.

Training Before Hoisting

This Technician voiced adamantly the need to complete video training before operating a hoist. The plea for mandatory training was backed by historical evidence of operational issues involving untrained Technicians.

◆ This is the second request to bring attention to the issue with a Fish Pole [hoist]. We continue to receive this tool in the shop that clearly has not been operated properly. In [report] we indicated an injury. There

was a [request] sent to the calibration lab to install on the storage box which will lead the Technician to the video. There is an issue with this process. It does not update the training record on file. There is no guarantee someone will watch the video. This [now totals several] issues in the past...months.

We produced and supplied a training video on the proper operation of the Fish Pole after the first incident. It has still not been made mandatory for the Technicians in the field using the Fish Poles. Because of that, the Technicians have not received the proper training on the correct method of operation. Because of that we have seen bird caging/ back lashing on the spool, and damaged cables. The Auxilliary Power Unit or the other components being lifted could have dropped and caused very serious injury or damage. We have a safety responsibility to assure every Technician and supervisor reviews this video and understands the operation. [We suggest] mandatory annual recurrent training.



NOTE TO READERS: ■ Indicates an ASRS report narrative [] Indicates clarification made by ASRS

Heat Injuries—Don't Let Them Sneak Up on You

(By: Susan Cadwallader Source: Various)

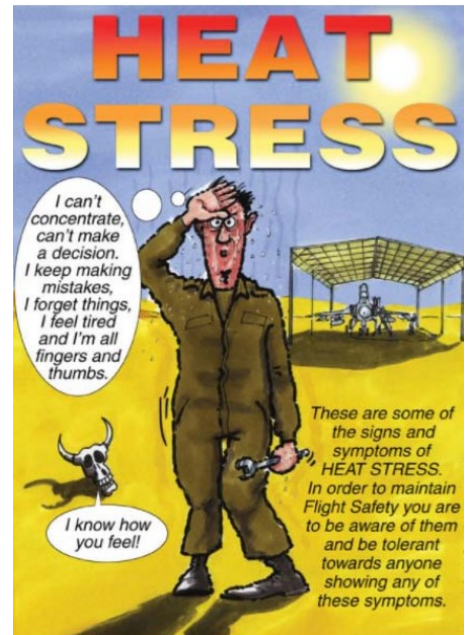
Every year thousands of workers become sick from occupational heat exposure and some even die. These illnesses and deaths are preventable. With summer upon us, it is time to shift our thinking toward the topic of Heat Injuries. It is an old topic that doesn't change much—except that heat injuries still catch people by surprise.

If you remember nothing from this article except one thing— let it be this: new workers and those returning from time away are especially vulnerable. That's why it is important to prepare for the heat: educate workers about the dangers of heat, and acclimatize workers by gradually increasing the workload or providing more frequent breaks to help new workers and those returning to a job after time away build up a tolerance for hot conditions.

This article includes causes, types, and symptoms of heat injuries and how to treat each one. Additionally it includes techniques to prevent heat injuries before they happen and what your responsibilities are.

Causes and Types of Heat Injury

Before we talk about preventing heat injuries, we need to understand what a heat injury is and we need to be clear that heat does cause “injuries”. Euphemisms such as “heat episode” or “heat incident” are not accurate descriptions and are dangerously misleading. Exposure to abnormal or prolonged amounts of heat and humidity without relief or adequate fluid intake can cause four types of heat-related illness and injuries. These are listed below in order of severity with the most severe listed first. **Note** that heat injuries can become a progression if left untreated. In other words, if you get a heat cramp and do not take adequate measures to treat it, it can turn into heat exhaustion and then heat stroke. Heat stroke, the most serious form of heat-related illness, happens when the body becomes unable to regulate its core temperature. Sweating stops and the body can no longer rid itself of excess heat. Signs include confusion, loss of consciousness, and seizures. Heat stroke is a medical emergency that may result in death! **Call 911 immediately.**





Heat exhaustion is the body's response to loss of water and salt from heavy sweating. Signs include headache, nausea, dizziness, weakness, irritability, thirst, and heavy sweating. Heat injuries at this level or higher will often have a long-lasting residual effect on the person such as an overall reduction in heat tolerance for the rest of their life.

Heat cramps are caused by the loss of body salts and fluid during sweating. Low salt levels in muscles cause painful cramps. Tired muscles—those used for performing the work—are usually the ones most affected by cramps.

Cramps may occur during or after working hours. People often report these cramps waking them up in the middle of the night, which may make it seem unrelated to what happened that day at work.



Heat rash, also known as prickly heat, is skin irritation caused by sweat that does not evaporate from the skin. Heat rash is the most common problem in hot work environments.

	Symptoms	First Aid*
Heat stroke	<ul style="list-style-type: none"> Confusion Fainting Seizures Excessive sweating or red, hot, dry skin Very high body temperature 	<ul style="list-style-type: none"> Call 911 <p>While waiting for help:</p> <ul style="list-style-type: none"> Place worker in shady, cool area Loosen clothing, remove outer clothing Fan air on worker; cold packs in armpits Wet worker with cool water; apply ice packs, cool compresses, or ice if available Provide fluids (preferably water) as soon as possible Stay with worker until help arrives
Heat exhaustion	<ul style="list-style-type: none"> Cool, moist skin Heavy sweating Headache Nausea or vomiting Dizziness Light headedness Weakness Thirst Irritability Fast heart beat 	<ul style="list-style-type: none"> Have worker sit or lie down in a cool, shady area Give worker plenty of water or other cool beverages to drink Cool worker with cold compresses/ice packs Take to clinic or emergency room for medical evaluation or treatment if signs or symptoms worsen or do not improve within 60 minutes. Do not return to work that day
Heat cramps	<ul style="list-style-type: none"> Muscle spasms Pain Usually in abdomen, arms, or legs 	<ul style="list-style-type: none"> Have worker rest in shady, cool area Worker should drink water or other cool beverages Wait a few hours before allowing worker to return to strenuous work Have worker seek medical attention if cramps don't go away
Heat rash	<ul style="list-style-type: none"> Clusters of red bumps on skin Often appears on neck, upper chest, folds of skin 	<ul style="list-style-type: none"> Try to work in a cooler, less humid environment when possible Keep the affected area dry

* Remember, if you are not a medical professional, use this information as a guide only to help workers in need.

Symptoms and Treatment of Heat Injury Now that we have gone over the causes and types of heat injury, let's move on to the treatment. The diagram above provides an excellent and succinct summary of the four types of heat injuries including their symptoms and first aid measures. It is recommended that you post this chart in your workplace.

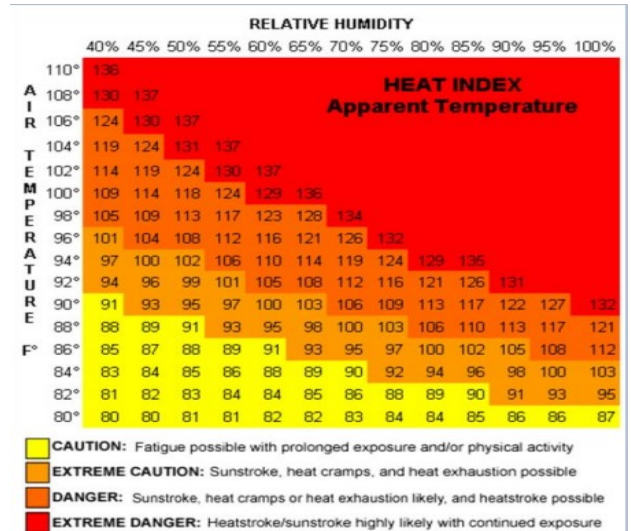
Prevention Hopefully by now, you are certain you do not want to have anyone in your organization experience a heat injury—so now let's get down to business on how to prevent heat injuries of any type. OSHA's Heat Injury prevention campaign has a slogan "Water, Rest, Shade". While this is certainly correct information, a methodical risk managed approach will take into account all factors including: temperature and humidity, type of activity, individual tolerance, and length of exposure.



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Let’s talk about temperature and humidity first.

The U.S. National Oceanographic and Atmospheric Administration (NOAA) developed a heat index system represented by the chart on the right. The heat index combines both air temperature and relative humidity into a single value that indicates the apparent temperature in degrees Fahrenheit, or how hot the weather will feel on the skin. The higher the heat index, the hotter the weather will feel, and the greater the risk that outdoor workers will experience heat-related injury. So the way this works is to first determine what your heat index temperature is and then note what color band it is in. Once you have the color, utilize a Protective Measures Chart to determine what Plan Elements you need to put in place (see chart below).



Plan Element	Heat Index Risk Level			
	Lower (Caution)	Moderate	High	Very High/Extreme
Supplies (ensuring adequate water, provisions for rest areas, and other supplies)	✓	✓	✓	✓
Emergency planning and response (preparing supervisors and crews for emergencies)	✓	✓	✓	✓
Worker acclimatization (gradually increasing workloads; allowing more frequent breaks as workers adapt to the heat)	✓	✓	✓	✓
Modified work schedules (establishing systems to enable adjustments to work schedules)		✓	✓	✓
Training (preparing workers to recognize heat-related illness and preventive measures)	✓	✓	✓	✓
Physiological, visual, and verbal monitoring (using direct observation and physiological monitoring to check for signs of heat-related illness)		✓	✓	✓

For example a 94 degree day with 50% humidity results in a heat index of 102 according to the chart on the right. That heat index number falls in the light orange band (defined as “Extreme Caution” in the legend). From the Protective Measures Chart, the light orange column (“moderate”) lists the Plan Elements you should have in place for those conditions.

It is very important to note that NOAA devised the heat index values for shaded conditions and light winds. **Full sunshine can increase heat index values by up to 15 degrees Fahrenheit.**

[It should be added that OSHA has an iOS and an

Android app that can do these calculations for you—and that app was recently improved. Search for “OSHA-NIOSH Heat Safety Tool” in the App store from your device.]

What about type of activity?

It goes without saying that strenuous activities are more likely to induce a heat injury than non-strenuous activities. What isn't clear though in that statement is the subtle way that activities can shift from non-strenuous to strenuous and the various degrees in between. Piloting an aircraft from Point A to Point B is usually not very strenuous. As soon as we change that to a fire-fighting scenario, the demands on the pilots' scan, concentration, and precision of flight control movement change this to a more strenuous activity. When we focus hard, we forget to take breaks or drink water. The same concept applies to ground maintenance personnel. Conducting a turnaround inspection versus changing an engine—even with all the right tools, is a more strenuous activity that can quickly grow into a long hours stressful ordeal. Heat injury investigations often reveal a situation in which the situation evolved incrementally, thus making it hard to recognize. Do not let heat injuries sneak up on you.



And finally let's talk about individual tolerance and length of exposure—since they go hand in hand.



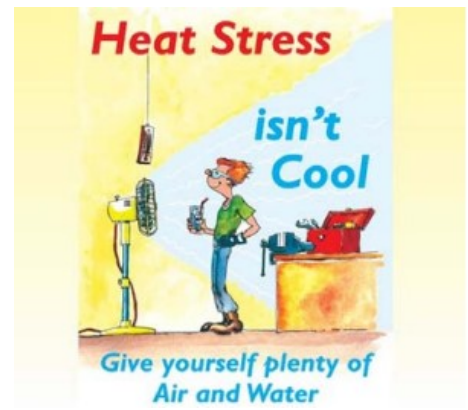
Humans are, to a large extent, capable of adjusting to the heat. This adjustment to heat, under normal circumstances, usually takes about 5 to 7 days, during which time the body will undergo a series of changes that will make continued exposure to heat more endurable. The exception to this may be somebody who has previously incurred a heat injury—they may need more time to acclimate or they may not be able to acclimate at all. Additionally elderly, sick, or obese people generally have difficulty acclimating to high heat.

On the first day of work in a hot environment, the body temperature, pulse rate, and general discomfort will be higher. With each succeeding daily exposure, all of these responses will gradually decrease, while the sweat rate will increase. When the body becomes acclimated to the heat, the worker will find it possible to perform work with less strain and distress.

Gradual exposure to heat gives the body time to become accustomed to higher environmental temperatures. Forty percent of heat injuries occur among workers who have not been given time to adjust to working in the heat or among workers who have been away from hot environments and who have gotten accustomed to lower temperatures. Hot weather conditions of the summer are likely to affect the worker who is not acclimatized to heat. Likewise, workers who return to work after a leisurely vacation or extended illness may be affected by the heat in the work environment. Whenever such circumstances occur, the worker should be gradually reacclimatized to the hot environment.

What is my responsibility?


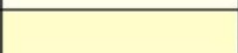
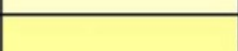





Employers are required to provide employees with a place of employment that is free from recognizable hazards that are causing or likely to cause death or serious harm to employees. In the case of heat injury prevention, a full risk assessment of heat exposure risks in your environment should be conducted. Create mitigations that are appropriate. One way to do this is to use the Plan Elements dictated in the chart on page 4 as a guideline. Another way would be to search the internet for heat injury prevention policy samples.



Employees are required to adhere to all organizational policies related to heat injury prevention and to actively participate in its success. Be a good example, stay alert for any symptoms of heat injury in your co-workers, and follow the tips below.

Tips to Stay Cool When Working on Hot Days

- Drink a lot of cool water all day, before you feel thirsty. Every 15 minutes, you may need a cup of water (5 to 7 ounces). You should be urinating frequently and use the chart to the right as a guideline for determining if you are adequately hydrated.
- Keep taking rest breaks. Rest in a cool, shady spot. Use fans.
- Wear light-colored clothing, made of cotton.
- Work in the shade. Consider purchasing shade canopies.
- For heavy work in hot areas, take turns with other workers, so some can rest.
- If you travel to a warm area for a new job, you need time for your body to get used to the heat. Be extra careful the first 2 weeks on the job.
- If you find yourself making bad decisions, can't concentrate and dropping things, take a break and assess the situation. Talk to the supervisor
- If you work in protective clothing, you need more rest breaks. You may also need to check your temperature and heart rate.

AM I HYDRATED?		
Urine Color Chart		
1		
2		If your urine matches the colors 1, 2, or 3, you are properly hydrated.
3		Continue to consume fluids at the recommended amounts.
4		If your urine color is below the RED line, you are
5		DEHYDRATED and at risk for cramping and/or a heat illness!!
6		YOU NEED TO DRINK MORE WATER!
7		
8		



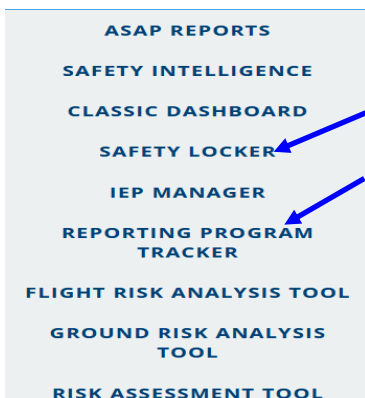
In summary, a heat related injury is a completely preventable event. Forty percent of heat injuries occur when the victim has been in the heat environment for no more than two weeks. Organizations and individuals need to educate and remind themselves of how to recognize and treat heat injuries. Additionally employers and employees need to actively address the risk of heat injury in their organization and actively participate in its prevention. Do not let heat injuries sneak up on you.

SAFETY MANAGER'S CORNER

The Publish Function

One of the core functions of an SMS is distributing the information within your organization. ARMOR makes this easy to do with the Publish Function.

Look for this symbol:



Several Tools have this capability:

Safety Locker

RPT

(You can also publish reports in the FRAT, GRAT, and completed IEP Checklists)

Once you have clicked the symbol a window will appear:

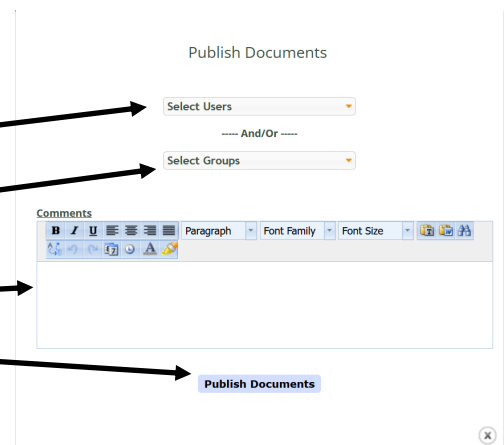
From here you can select an:

Individual

Or Groups that you have created.

Got something to say about it? Don't worry, add comments in the text box before you publish them.

Finally hit Publish, and HOORAY!



You have just sent an email with a link to the report/document!

The benefits are endless. We find that most of our users use this function to communicate important documents through the Safety Locker, as well as sanitized Hazard reports from the Reporting Program Tracker. How will you use it?



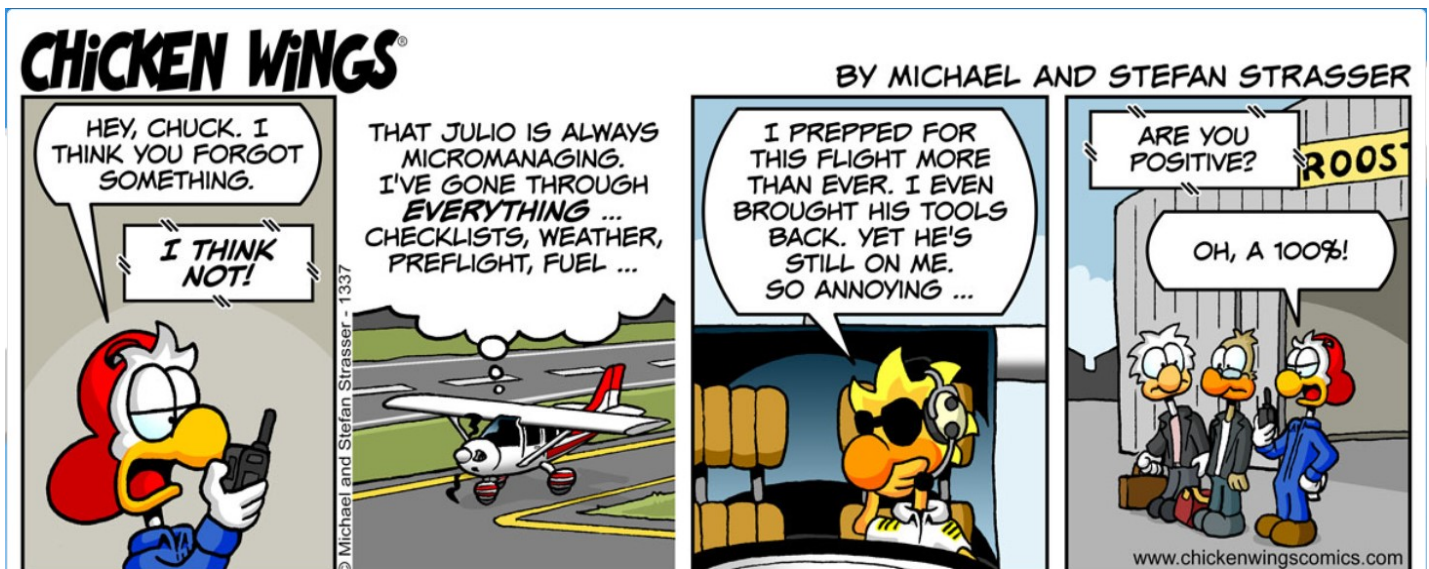
Quote of the Month

“Change happens by listening and then starting a dialogue with the people who are doing something you don't believe is right.” – **Jane Goodall**



In a functioning SMS, communication is key. All four components and twelve elements of Safety Management have some form of communication built into them. Whether that is (1.4) Coordination of emergency response planning, (2.2) Safety risk assessment and mitigation, (3.3) Continuous improvement of the SMS, or (4.2) Safety Communication; they all have “dialogue” built in. Continuous improvement doesn't occur without people speaking up when something is not right and those concerns being heard by the stakeholders. “That's the way it's always been done” doesn't mean that's the way it should be done. Managers should encourage employees to report safety concerns and those concerns should be addressed with sincerity and include feedback to the staff so that they understand if and what actions were taken.

CHICKEN WINGS



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UPCOMING COURSES

Aug 22 to Aug 26, 2022—PROS Course
Aviation Lead Auditor Training (ALAT)
Denver, CO

Sept 27 to Sept 29, 2022—PRISM Course
Safety Management System (SMS)
Denver, CO

Oct 3 to Oct 7, 2022—PROS Course
IOSA Auditor Training
Denver, CO

Nov 28 to Dec 2, 2022—PROS Course
Aviation Lead Auditor Training (ALAT)
Denver, CO

Dec 12 to Dec 16, 2022—PROS Course
IOSA Auditor Training
Denver, CO

Go to [Upcoming Training Classes](#) to register.