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Upcoming Events

Do you know of an event that you would like us to share?
Send information to Janine King at janine.ctr.king@faa.gov.

MRO Latin America

[Cartagena, Colombia \(January 22-23, 2020\)](#)

AeroEngines Americas

[Miami, Florida \(February 4-5, 2020\)](#)

Routes Americas 2020

[Indianapolis, Indiana \(February 4-6, 2020\)](#)

MRO Middle East Summit & Expo

[Dubai, United Arab Emirates \(February 24-26, 2020\)](#)

2020 International Women in Aviation Conference

[Lake Buena Vista, Florida \(March 5-7, 2020\)](#)

MRO Australasia

[Brisbane, Australia \(March 10-12, 2020\)](#)

Routes Asia 2020

[Chiang Mai, Thailand \(March 8-10, 2020\)](#)

6th Annual Singapore Aviation Safety Seminar (SASS)

[Singapore Aviation Academy, Singapore \(March 17-20, 2020\)](#)

65th Annual Business Aviation Safety Summit (BASS)

[Savannah, Georgia \(April 29-30, 2020\)](#)



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<p>Want to share an article, experience, or provide suggestions for the FAA Aviation Mx HF Newsletter?</p> <p>Every submission will receive prompt feedback. Our great editors review beyond just spellcheck to ensure that content and format meet the needs of our readers. All feedback is subject to author review and sign-off prior to the publication. Newsletters are published every 3 months (quarterly), starting at the end of March. Submissions made early in the quarter are typically included for the upcoming issue. If you would like to discuss your idea prior to the writing phase, please e-mail Dr. Bill Johnson at bill-dr.johnson@faa.gov for guidance or recommendations. Send your submissions to Janine King at janine.ctr.king@faa.gov. If you have any interesting maintenance safety images, please include them in your submission with an image caption. We appreciate your input!</p>	<p>We would like to extend our gratitude to the readers and authors for their continued support of this newsletter. We enjoy your reviews and look forward to future article submissions. Keep up the good work! Our contributors are not primarily responsible for writing articles for this newsletter, however, the vast majority are experts in their fields when it comes to issues related to aviation maintenance. Most importantly, we value their input and reviews that bring interest and value to readers of this quarterly forum.</p>

Meet the Authors

MSgt George “Jorge” Dunseath

MSgt George Dunseath has been serving in the United States Air Force for 19 years as a Career Enlisted Aviator (CEA) onboard the E-3 “Sentry” AWACS. He is currently assigned to the 552d Air Control Wing’s Wing Inspector General Inspection Office located at Tinker Air Force Base, Oklahoma.



Judith Grigsby

Judith Grigsby is a Maintenance Quality Assurance Analyst with Air Evac Lifeteam and also an A&P technician with Inspection Authorization. She has over 23 years of aviation maintenance experience that began as an avionics technician, CH-47 maintainer, and aviation maintenance manager in the US Army. After transitioning into civil aviation, she maintained rotorcraft as a field base mechanic for over a decade with her current company. She is working towards earning her B.S. degree in Aviation Maintenance Management with Southern Illinois University and also serves on the Board of Directors with the Association for Women in Aviation Maintenance (AWAM), as an Education Co-Chairperson.



Dr. Bill Johnson

Dr. Bill Johnson, a frequent contributor to this newsletter, is the FAA Chief Scientific and Technical Advisor for Human Factors in Aircraft Maintenance Systems. His comments are based on nearly 50 years of combined experience as a pilot, mechanic, airline engineering and MRO consultant, a professor, and an FAA scientific executive.



Dr. Kylie N. Key

Dr. Kylie N. Key is an Engineering Research Psychologist for the Flight Deck Human Factors Research Laboratory at the FAA’s Civil Aerospace Medical Institute (CAMI). Her primary research interests are decision-making in risky, complex scenarios; social and cultural values that affect workplace safety and behavior; and statistical/computational models of cognitive phenomena. She recently completed her final year in the Cognitive Psychology PhD program at the University of Oklahoma.



Cathy Landry

Cathy Landry is president and owner of Northrop Rice, a Houston-based company that provides training and management services to the aviation industry. Landry offers more than 30 years of experience in the aviation maintenance training (AMT) field. She focuses on the development and implementation of maintenance training programs, Human Factors, AMT courses and on-the-job training processes. She continues the legacy of her family business in providing training expertise and guidance to support the aviation maintenance industry.



John J. Paonessa

John is the Aircraft Mechanics Fraternal Association ASAP Representative at Southwest Airlines. He is retired from the Air Force and also is an AMT with a combination of approximately 40 years' experience in military and civilian aviation. He holds a B.S. in Aeronautics with a minor in Aviation Safety from Embry-Riddle University. John is diligent in his work to finding ways to improve the safety culture in maintenance at SWA!



Michael S. Salmon

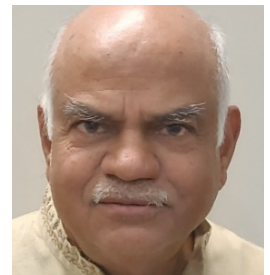
Michael Salmon is a Base AMT with Air Evac Lifeteam 45 in Fayette, Alabama. From 2006 to 2017, he served in the US Army as an AH-64D repairer and technical inspector in 1-82 ARB (WPFL) at Fort Bragg, North Carolina. Mike is an Embry-Riddle Aeronautical University – Worldwide student; pursuing a bachelor's degree in aviation maintenance and a minor in management.



Vinod Saxena

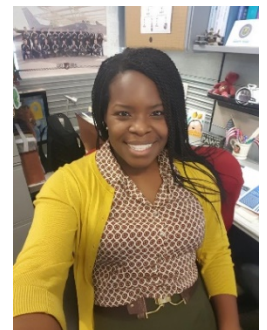
Vinod Saxena is a professor at Amity University Aerospace Department at Lucknow, India, and is also Quality Manager at IGRUA, a premier civil pilot training institute in the country. He had earlier served at Hindustan Aeronautics Ltd, India, for over 35 years, serving in its Engineering as well as Quality Departments for both civil and military aircraft, at various working and management levels.

He was instrumental in hosting an international conference on airworthiness and safety, at Amity University Lucknow Campus, India, in August 2019.



Sabrina Woods

Sabrina Woods is a human factors analyst with the FAA Office of Accident Investigation and Prevention (AVP). Previous to AVP, she was a human factors scientist with the Air Traffic Organization, and writer/editor for the FAA's general aviation magazine, the *FAA Safety Briefing*. She is currently a doctoral candidate at Embry-Riddle Aeronautical University studying Aviation Human Factors with an emphasis in detecting errors of cognition. Miss Woods has over 14 years of experience as a researcher and practitioner in applied aviation safety theory, human factors, human performance, and aircraft accident investigation with the FAA and with the United States Air Force. She is an active and contributing member of the Human Factors and Ergonomics Society. In her spare time, Miss Woods enjoys playing and watching ice hockey, long-distance bike events, and being dog-mom to two incredibly spoiled miniature dachshunds.



“A Thousand Times Before...” A Look at Complacency in the Workplace

Sabrina Woods

This article was originally published in Nuts, Bolts, and Electrons as part of the March/April 2013 issue of FAA Safety Briefing. Access the article [here](#).

One of my hobbies is baking, and the holiday season gives me a chance to flex my *Iron Chef* prowess and break out the bamboo spatulas and silicone bakeware. A favorite recipe is chocolate chip cookies, and it is one that I do often. So often that I know the recipe cold. So cold that I’m sure I don’t need to bother with tracking down the dog-eared recipe card to follow it. *I got this*. I’ve done this a thousand times before.

Such was my attitude one day in December when I wanted to bring some treats to the office in a goodwill gesture. Approximately one hour after pinches of this, dashes of that, and some vigorous mixing, my cookies came out of the oven. Imagine my horror when I found misshapen, hard little lumps of pale yellow coal instead of the moist, delicious, golden-brown goodness I was expecting. Puzzled and disappointed, I scratched my head until I figured it out. I had forgotten the baking soda.

Although seemingly a minor element of the recipe (one easily overlooked when relying on memory), that half teaspoon of baking soda is an important catalyst in baking. It acts as a leavening agent that keeps the dough tender and moist and, in conjunction with salt, it also acts as a browning agent (hence the pale yellow cookies). So into the trash went my coal, taking a generous chunk of my ingredients — and some of my holiday goodwill.

How could I mess up such an easy task I had done a thousand times before? Though harmless in this case (except to my pride), this little debacle is a good illustration of what can happen if we aren’t careful in circumstances that matter a lot more.



WARNING
BEWARE
COMPLACENCY

“I Got This” Complacency

Many of you recognize complacency as one of the famous “Dirty Dozen” factors that threaten safety. Merriam-Webster defines complacency as self-satisfaction accompanied by unawareness of actual dangers or deficiencies. Human factors theorists define complacency as becoming overconfident in one’s work, to the point of assuming that since something has worked in the past, it will work the same way in the future. In other words, if you have done something “a thousand times,” why should you look at the technical data to confirm you are correctly installing that oil pump? The answer is, quite simply, because you might make a mistake. And, unlike the cookie conundrum, a mistake in aviation maintenance might not be as easy a fix as throwing it away and starting over.

When complacency kicks in, people often allow experience to guide expectations. We humans like to take shortcuts or skip “unnecessary” steps. We dismiss the discipline of following the proper guidelines and procedures, developing a potentially dangerous mindset that “everything will be ok and nothing could possibly go wrong.” These faults compound when complacency meets fatigue in a combination that can be disastrous.

Sweat the Small Stuff

My time in the Air Force afforded me the opportunity to work with some of the sleekest, fastest, and most lethal jets in the world. I can tell you that there is nothing more gut-wrenching than that moment following an aircraft mishap when you realize that you and your team might have done something wrong, or missed something vital.

What we do is important. Yes, it can feel monotonous and mundane at times, but every little detail of what we service or inspect matters. I personally know of a missing

flap actuator cotter pin bringing down an F-15E, and in the commercial sector, Air Midwest Flight 5481 serves as a tragic example of what can happen when technicians fail to follow procedures when rigging an elevator cable.

For general aviation, the dangers are just as prevalent. The accident databases are chock full of examples of incorrectly installed levers, crossed wires, missing locking devices, and inappropriate hardware. I am willing to bet it was correct in the book every time, but somewhere, someone made a mistake. Someone might have even

become complacent. In short, someone failed to “sweat the small stuff.”

Avoiding this pitfall is pretty easy. Always, always, ALWAYS perform every job according to regulation and procedures. Checklists are your friends — use them! Never work from memory. Always go back and verify your job upon completion. Finally, remind yourself of the dangers of complacency. It exists. We can all be susceptible if we aren’t careful, and when that happens, we stand to lose a lot more than a batch of cookies.

Another Round of Procedural Compliance

Dr. Bill Johnson & Dr. Kylie N. Key

We have written about Failure to Follow Procedures (FFP), or “procedural noncompliance,” a lot lately. Revisiting this topic is like pro golfers going to the practice green daily. The topic needs continuous reinforcement. So, here we go again. This article is another dose of government and industry effort to change the culture of procedural compliance.

Many of you have heard “Dr. Bill” Johnson talk about procedural compliance. He starts by asking questions like:

- Do you know what a procedure is?
- Do you know where procedures can be found?
- Do you know how to follow a procedure?
- Do you know it is a regulation that you follow a written procedure?

The answer to all of the above questions are always “yes” or “affirmative.” Johnson then proceeds with a tougher question. He asks:

- Then, why is procedural compliance the #1 challenge in maintenance?
- Why is it the top reason to file a voluntary disclosure or an Aviation Safety Action Program (ASAP) report?
- Why is procedural noncompliance usually a contributing factor to an event?
- Why will any FAA inspector tell you it is the most common administrative action against mechanics?

Of course, these latter questions cannot be answered with a “Yes” or “No.” There are a variety of long answers that offer possible actions/solutions for regulators, industry, and individual maintenance personnel alike.

Still the #1 Problem According to Airline Interviews

During December 2019, Johnson spoke with five large US carriers, mostly to confirm the obvious. Without exception, procedural noncompliance is the unanimous #1 contributing factor for events and ASAP reports. One senior airline safety professional made a serious comment “...that nearly every event has some procedural noncompliance issue....” He said that non-compliance could extend anywhere from initial design and certification to operations and maintenance/inspection. That is a high-level view of noncompliance. However, it will take more specific attention to each workforce segment in order to fix the challenge. Failure to follow procedures is everyone’s problem, therefore each of us can contribute to the solution. In the next section, we remind the reader of a training course that reminds users of this key message.

“...Nearly every event has some procedural noncompliance issue...”

During the airline interviews, another airline executive commented that he sees a culture of noncompliance that must be addressed. The new training program and support materials (more about that below) are doing just

that: trying to address the culture. We know that our plans are difficult and perhaps idealistic. The Johnson answer has been, “If you have an idea better than this one, please share it.”

Recent FAA Progress on Changing FFP Culture

In October 2018, FAA launched the “The Buck Stops Here” FFP training initiative. Briefly, we promoted eleven attributes of a “Champion for Following Procedures” (See Figure 1).

We also created Before-and-After Procedure Following Task Cards for AMT, Managers, and Procedures Writers. Previous newsletter articles (June 2018, December 2018, September 2019) also describe the training. Some companies have adopted this course for their recurrent training program, and we expect that many more will in the future! To access the training, go to www.followprocedures.com.

The training has been available for 15 months on the FAA Safety Team website. Inspector Guy Minor, FAA Safety Team Airworthiness Lead, reports that the FFP training has been accessed by over 7,000 users, almost all of whom have completed the training. Feedback has been overwhelmingly positive. Here are just a few of the comments the Safety Team has received:

- Excellent course that covers Safety Culture, Quality Culture and Human Factors for maintenance.
- A very helpful reminder of what is at stake and how we can effectively help each other eliminate FFP's.
- This is the best course that I have taken in the Learning Center Library.
- The Titanic was a great teaching tool.
- Excellent course. FFP is a very common error on maintenance performance and deserved a course on the topic!
- Well done. Thank you to those involved in creating and promoting this course!



Figure 1. Safety Champion Attributes.

- Great course... I like the examples of helping to hold each other accountable and taking responsibility for our own actions AND those we work with.
- Please, if possible, try to extend a translated version (if possible, Spanish) for this training course for mechanics all over the world who works with US aircrafts.

Thank you to everyone for your comments, good or not-so-good! Your feedback is critical for helping us to improve this and future training programs. As always, we strive to create training programs that are useful and relevant. If you have any feedback regarding the FFP training, please send it to Kylie Key at kylie.n.key@faa.gov or Bill Johnson at bill-dr.johnson@faa.gov. The course also comes with Before-and-After Procedure Following Task Cards. The FAA has distributed a few thousand of these cards. Some companies have printed their own versions.

“Great course... I like the examples of helping to hold each other accountable and taking responsibility for our own actions AND those we work with.”

For example, the Aircraft Mechanics Fraternal Association added their logo and are printing the cards for all maintenance groups at Southwest Airlines (see Figure 2).

Find all printing specifications at www.humanfactorsinfo.com under the “Training & Tools” tab, or contact Janine King at janine.ctr.king@faa.gov for specific printing details.

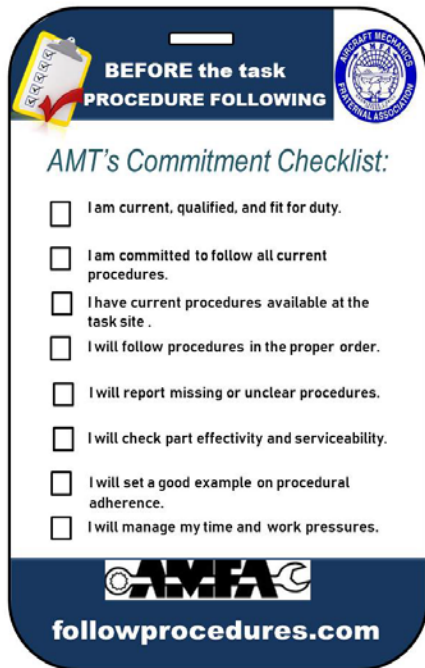


Figure 2. One company's logo added to the Before-and-After Procedure Following Task Cards.

What's Next?

The promotional task never ends. Training and job cards are only the beginning. The FAA initiated this renewed effort and will assist as appropriate. Now, industry must refresh its commitment to following procedures. The FAA Follow Procedures training should be delivered and discussed by training, engineering, and safety departments. Companies should print and promote the Before-and-After Procedure Following Task Cards be worn on employee badge lanyards.

These are small investments that can lead to big changes in the long run. But monetary commitment is not enough. Senior management must commit to continuing and enhancing attention to following work procedures. Inadequate procedures, for any reason, must be reported and addressed. If the procedure has an issue then it must be reported and fixed as soon as reasonably possible. Organized labor must lead the efforts to help enhance the goal to reduce FFP events. The FAA must work with individuals and industry to find paths to addressing FFP. Individuals should take the training and job cards seriously. If procedural noncompliance is everyone's problem, then it is everyone's opportunity to improve.

Procedure Following Cards – Print Your Own!

We are happy to announce that print specifications for the Before-and-After Procedure Following Task Cards are now available online! These cards remind personnel of important steps to complete before, during, and after performing tasks. Cards are laminated and designed to hang from your lanyard.

The FAA's Aerospace Human Factors Research Division has a small number of cards available for distribution. Some companies have elected to personalize the cards by adding their company logo. As a reminder, most organizations have vastly different numbers of each position. Please consider the number of cards you will need for each position prior to ordering. For example, your group may have 100 AMTs, 10 Supervisors/Managers, and 5 Procedure Writers.

Printing specifications are available on the Human Factors in Aviation Maintenance website (humanfactorsinfo.com), under the “Training & Tools” tab. For additional information about the procedure following cards, see our December 2018 issue, [Changing the Culture of Following Procedures: Start Here](#).



Ethics in Aviation Maintenance Outsourcing

Michael S. Salmon

“Aviation in itself is not inherently dangerous. But to an even greater degree than the sea, it is terribly unforgiving of any carelessness, incapacity, or neglect.”

-A.G. Lamplugh

The aviation industry is growing, and yet the availability of skilled maintenance professionals worldwide is on a steady decline (Boeing, 2019). At the same time, airlines continually look for ways to lower costs and maintain or increase profits. Outsourcing maintenance to third party vendors saves airlines millions of dollars each year, but their utilization generates an ethical concern; passenger safety.

The major issue in outsourcing maintenance is the lack of regulatory oversight in many third-party vendors; especially in maintenance facilities outside the United States (Hoppe, 2019). The Federal Aviation Administration (FAA) allows for maintenance to be performed by either certified repair stations under Part 145, or non-certified repair stations, as long as the company that owns the aircraft accepts responsibility for the work performed (Van Wagner, 2007). These facilities are largely unchecked by FAA inspectors, yet the maintenance performed in these facilities include major overhaul and maintenance on large passenger airliners (McFadden & Worrells, 2012). This leads us to the major question as to whether the reduced cost of outsourcing maintenance is ethically sound when risk mitigation is considered.

The number of aircraft accidents have generally remained stagnant each year with little change since 2013 (see Figure 1). The rise of global outsourcing raises concerns voiced by industry professionals; lack of communication, knowledge, and federal oversight at non-certified facilities, and an increasing number of aircraft crashes year after year attributed to sub-par maintenance (Van Wagner, 2007).

Cost of Doing Business

The global MRO market is on the rise; jumping in annual revenue by \$4 billion from 2008 to 2017 (McFadden & Worrells, 2012). Contracted maintenance facilities that are not certified under Part 145 can see a decrease of labor cost to providers by as much as half, resulting in major savings by the airline. The economic problem for the carrier is this: once the airline moves a majority of its maintenance to overseas and domestic non-certified vendors, it can cripple the airlines' ability to bring major maintenance back to in-house facilities where proper oversight can be achieved (Hoppe, 2019).

Low cost carriers (LCC)s are shaking up the market by (as the name implies) keeping ticket prices very low, and by offering once-standard amenities at an additional cost, such as in-flight drinks and carry-on baggage (Hoppe, 2019). Because of the reduced cost, LCCs must outsource maintenance to stay in business (Van Wagner, 2007). Given the lack of regulatory oversight, this puts passengers at a safety risk as all the maintenance is

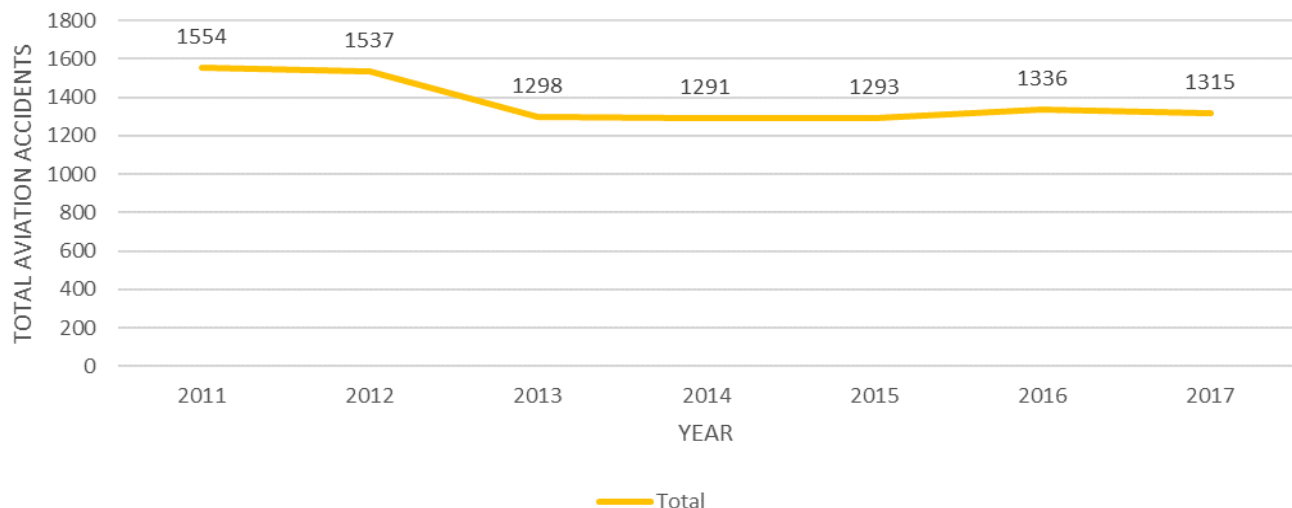


Figure 1. Trend of total aviation accidents in the United States 2011-2017. Totals include Part 121, Part 135, and Part 91 flights. Adapted from NTSB Review of accident data. Copyright 2019 by National Transportation Safety Board.

handled by third party vendors with reduced oversight. Passengers and stakeholders may not see the detrimental effect this may have on passenger safety.

Certified and Non-Certified. What's the Difference?

In order for a repair station to be certified under Part 145, the business must submit repair station and quality control manuals, a description of the scope of the repair station, names and positions of management and supervisors, the physical address of the facility, and a detailed training program (Van Wagner, 2007). FAA inspectors are also required to visit these facilities and inspect the facilities to ensure the repair station is operating to the standards set forth in their approved manuals (Hoppe, 2019). In a stark contrast, the only requirement the FAA has on non-certified repair stations is that one FAA-certified mechanic is on hand to sign off on the work performed at the facility (Drury, Guy, & Wenner, 2010).

Ethical Dilemmas

The FAA estimates the total outsourcing of major maintenance by airlines has risen from 37% in 1996 to 64% in 2007 (McFadden & Worrells, 2012). Industry professionals are voicing a concern for the use of outsourced vendors because of regulatory loopholes that allow third party vendors to operate unchecked, which increases the potential for accidents in the future (Hoppe, 2019).

Is the reduced cost inherent with outsourced maintenance living up to the safety standard the airlines promise their customers, and is it truly as safe as the airlines claim it to be? The practice of outsourcing isn't illegal or immoral, but very profitable as it saves millions each year on operating costs (Drury, Guy, & Wenner, 2010). Economically, this makes sense to the airline. But the problem with outsourcing lies in the ethical responsibility of an airline to prioritize the safety of their customers. For the sake of safety, there are far better options than outsourcing aircraft maintenance to facilities with reduced oversight but doing so would be detrimental to an air carrier's profits, and seemingly impossible for LCCs.

Ethical Solutions

Overseas facilities promote a global diversity and global collaboration that the average customer can respect. However, stakeholders that know the difference may be concerned with the reduction in quality assurance involved in non-certified repair stations. Airlines could reserve the heavy, critical maintenance for domestic MRO facilities that are certified under Part 145. It is however the major maintenance that generates the highest cost, and it is the main reason for outsourcing in the first place (McFadden & Worrells, 2012). Airlines should also be promoting a strong safety culture with the repair facility; if they are not doing so already. The airline has a vested interest in the quality of their product and should do everything they can to ensure safety to the highest degree.

Conclusion

Outsourced maintenance is a solution that has allowed LCCs to compete with major carriers, which has resulted in lower ticket prices across the industry, but the lower cost solutions remove many of the quality controls in place. While non-certificated facilities tasked with heavy maintenance on passenger jets guarantees higher profits for the airline, it can compromise safety which

raises ethical questions regarding more frequent utilization of outsourced maintenance. Would the customer be willing to pay higher prices for a ticket if they knew how their aircraft was inspected or repaired? In any facility that conducts aircraft maintenance, certified or non-certified, there should be controls in place with the highest standards of safety in mind. To the carriers that rely on outsourcing to turn a profit; tread carefully.

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Airworthiness and Safety of Aircraft and its Systems and the Challenges Ahead

Vinod Saxena

This article is based upon the synthesis of ideas germinated during the interactions with the delegates of the recently held international conference on 'Airworthiness and Safety of Aircraft and its Systems and the Challenges Ahead' organized by Amity University, Lucknow Campus, India, in August 2019. The conference was aimed at providing a platform for the interaction between different stakeholders in aviation industry to share philosophies, science, technology and management aspects related to airworthiness and safety, and to understand the problems faced by each stakeholder. The conference was attended by over 150 delegates from aircraft operators, maintenance organizations, manufacturers, aeronautical design and research organizations, regulators, institutes and students from different universities. It provided rich insight into the current status of Airworthiness and Safety and the way ahead.

Airworthiness and Safety (A&S) requirements influence every sphere of aerospace activity, be it design, manufacturing, maintenance, operations or even the investigation of failures. The success of aerospace industry lies in its relentless efforts to improve airworthiness without compromising any aspect of safety and to make the flights increasingly safe and comfortable.

While the industry and its regulators are constantly imbibing knowledge from various disciplines of science and technology, including the behavioral sciences, it is becoming increasingly clear that an individual, a team or an organization works at its best and commits minimum mistakes when it is working with pride and satisfaction of doing a good job, is able to relate its work with the needs of the society and knows that the peers and society recognizes its work. This state of working may be called

'working with soul' by the individual, team or organization and A&S could make a quantum jump if the work is accomplished with the soul in it.



How to introduce this soul into the working environment is the challenge before the organizations and the regulators. The efforts may involve digging deeper into Human Factors (HF), Human Psychology and Behavioral Sciences and applying those findings to different entities involved in A&S. The following paragraphs discuss a way forward to yield the desired results.

1. Effectiveness of Aircraft Technician:

No amount of regulations can result in the improvement of A&S as much as the organizational environment in which a technician works with his soul in his job.

For such an environment, the regulations facilitate a technician in acquiring knowledge and competency, equip him with up-to-date information in time and ensure adequacy of resources to do a job.

HF, on the other hand, caution him to guard against complacency, distraction, fatigue, pressure, stress, faulty norms etc. to accomplish the task properly. A technician

may also have some inherent tendency, or even false pride, in taking shortcuts or bypassing some procedure/safety norms. Caution is required against these tendencies as well.

Merely acquiring the knowledge about such cautions and HF by a technician is not enough. What matters is the defense mechanisms that (s)he develops against such adverse factors in work-life. The process of building these defenses could be strengthened by,

- a) Increasing their training and retraining in HF, explaining why (s)he needs to imbibe it.
- b) Increasing re-trainings in technological areas emphasizing on cautions and warnings.
- c) Creating safety culture so that following of written procedures, adopting good engineering practices and taking care of safety precautions become the norm.
- d) Linking each job requirement with the organizational goals.
- e) Giving special recognition to those who embody a positive safety culture, as today a technician is rarely recognized and respected for following safe practices.

2. Safety Culture:

Organizational safety and work culture represent the actual working environment. It helps a worker to acquire good work-habits and develop a sense of pride in working with safety precautions and prescriptions for airworthiness. In turn (s)he automatically takes care of HF and commits less mistakes. Safety culture thus helps in creating the soul in the organizational systems and procedures and makes A&S practices self-actualizing.

The sphere of safety culture could cover not only the normal working conditions but also the investigations of incidences and accidents. A completely different set of HF come into play during such investigations, as people/organizations tend to give misleading details and may hide facts in defense of themselves or of their colleagues. A positive safety culture could encourage them to bring out the facts. It would also encourage owning of mistakes in time before an incidence takes place.

The mechanism of self-protection and the influence of associated HF could be bypassed during the search for

preventive measures if the brainstorming exercise is conducted not exactly on 'what happened' but on 'probable akin scenarios'. More on this in section 7.

Culture in an organization cannot be imposed, it has to be developed and evolved internally.

3. Organizational Responses:

Lack of sincerity in following the regulations, especially in the application of HF, appears to be a major cause of lower levels of quality and A&S in India.

Initially, a progressive organization sees regulations as a guide to enable it to establish procedures and practices to ensure safety and airworthiness. Unfortunately, due to miscellaneous reasons, management soon becomes defensive and start following regulations merely to avoid 'violations'. It then becomes an activity without a soul.

How regulators could approach this problem and guide the organizations needs further deliberations.

4. Involvement of Top Management:

The pride in work that Charles Rolls and Henry Royce gave to their employees cannot be given by any regulation. Building work culture requires full involvement and commitment of the top bosses. Sticking to its core values, even in the most adverse conditions, is what roots the culture.

Though a senior member of the management team is made 'Accountable Manager' as per regulations, his inclination may be heavily tilted towards return on investment and growth, rather than establishment of sound safety culture. At times, senior executives may themselves be encouraging the bypass of regulations and cutting corners in A&S procedures.

The challenge is to make the top management increasingly conscious about their social responsibility as the custodian of safe travel and their role in forming value-based safety culture.

Regulators could play an important role in this transformation by making the top management feel at home with the regulations, pointing out that the regulations only ensure sound systems and procedures by taking care of HF, limitations of technology, and the requirements of reliable operations.

The regulators could also form guidelines for a capsule of an 'awareness program' for the top management on HF,

safety culture, A&S procedures and best practices. They could also encourage them to attend conferences and seminars on A&S and HF for meaningful interaction with peers and gaining synergy for their efforts in A&S and safety culture.

5. The Role of Regulator:

The regulations take into account the human fallibility factors, reliability considerations, FMEA analysis, etc.

The challenge before the regulators is to bring the vigor back into management and front-line workers to increase their involvement in A&S. Regulations are otherwise just a rule-book. The regulators may consider their own increased participation in seminars and conferences, interacting with all the stakeholders, explaining the basis of regulations and taking their feedback to make the regulations more effective.

6. Working of HF specialists in unison with Management and Human Psychology Researchers:

A soulful culture is not possible unless the top management involves itself and is fully committed to it.

Normally the senior management comes with the management background. The subject matter of

management theories, HF and Human Psychologists tend to converge at that level. It is necessary that HF topics be introduced in MBA programs.

The specialists from these three disciplines could work together to create the right working environment. Joint conferences, seminars, and awareness programs involving specialists from these areas would help to promote A&S.

7. Use of Brainstorming and other techniques for Preventive Measures:

While it is difficult to make a person admit to his mistake, especially when there are chances of some fallback, it is easier to take care of preventive measures if the brainstorming techniques are applied on presumably hypothetical situations that were possible in an incidence. These techniques include,

- i) Use of cause and effect diagram
- ii) FMEAs
- iii) Fault tree analysis, etc.

A person may hesitant, or give incomplete details, when replying to 'what happened' due to miscellaneous reasons; but is likely to answer correctly, to the best of his knowledge, if asked about 'different ways in which something could happen' – especially in a brainstorming environment. Use of the brainstorming techniques do not allow bias to be built and encourage the participants to express their views without inhibition. It would thus help organizations' safety officers to identify possible conditions which could cause similar failures and arrive at preventive measures arising out of incidence/ accident.

Conclusions:

Improvements in A&S is a continuous journey. Its speed could be accelerated in case the employees work with their soul for A&S. This could be facilitated by the existence of a value-based safety culture. The development of safety culture, in turn, requires total commitment of the top management.

A number of broad measures have been suggested to achieve improvements in A&S.



Mindfulness in Maintenance

Judith Grigsby

Original version published in the September 2018 issue of Association for Women in Aviation Maintenance Quarterly Newsletter.

Editor's Note: The author's intent is to remind readers of "mindfulness" or having situational awareness and focus on the task at hand while performing aircraft maintenance. The term "mindfulness" used here is the opposite meaning of "mindlessness" or operating on autopilot. It is not to be confused with "mindfulness meditation", a recent trend in popular psychology.

We've all been there... We drive from point A to B during our daily commute only to arrive at our destination and not remember the trip we just completed. We're so familiar with the repetitive route and driving process, we basically operate our vehicle on autopilot. Add to that, common distractions, and endless streaming thoughts that occupy our awareness. So, what color was the truck that you followed most of the way home? How many times did you apply the brakes to avoid other traffic? Remember? Yet you still made it home without a second thought, although not focused on your driving. This is how accidents happen.

We are all inflicted with the "human condition." No matter what the task at hand is throughout our day, whether on the job or other activities, it is important to realize that our minds wander especially when we do things of a repetitive nature. This is one of many major challenges we face as aviation maintenance technicians due to the repetitive nature involved in our duties.

Day in and day out, we perform repetitive tasks and inspections. We inspect for corrosion and cracks in tight structural areas containing hundreds of rivets. We remove and install numerous components, and we "always" remember to secure the hardware every time; right? It "always" looks the same, we've done it a "million times"; we could even do it in our sleep...Right?

Complacency settles in when we become comfortable performing a task, our stress levels decrease, and our level of vigilance is lowered despite the risk involved.

Remember when we first started a new job on an unfamiliar airframe or system compared to our confidence level a year later? Sometimes, lacking

experience makes us more vigilant; approaching every task with unfamiliarity and complete attention. Similarly comparable, like when you're driving and suddenly there's a police vehicle behind you. You're immediately uncomfortable! You zap into hyper-awareness of your speed, turn down the radio, etc. After the police vehicle turns off, you divert back on autopilot.

Many factors can lead to a wandering mind or complacency as our standards relax. A sense of expectancy can develop through inspecting an area repetitively without issue; a technician may often "see" nothing or miss an obvious disconnection that is literally right in front of them.

"Complacency settles in when we become comfortable performing a task, our stress levels decrease, and our level of vigilance is lowered despite the risk involved."

An example of how expectant complacency works within our mind can be demonstrated in the following sentence: "Aoccdnig to a rscheearch at Cmabrigde Uinervtisy, it deosn't mttar in waht oredr the ltteers in a wrod are, the olny iprmoatnt tihng is taht the frist and lsat ltteers be at the rghit pclae." We are familiar with words beginning and ending with certain letters, so our mind automatically fills in and skips over letters because it assumes what the words are. Just as in our daily checks and preflight inspections, if not maintaining discriminating focus, our mind will assume and see what it expects.

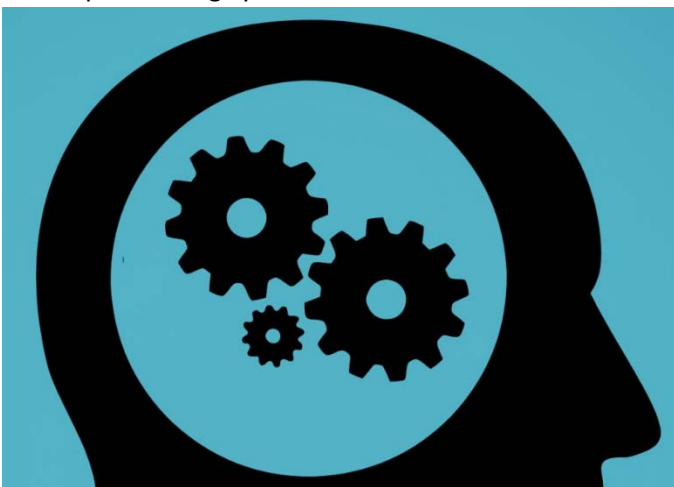
Part of our human condition is that it is easy to become victims of complacency. We fall into our routines, our minds aren't always on task, and we check out mentally while not thinking about what we are doing. No one is immune. But remember, our mind is our MOST important safety device! To safely do our jobs, we must keep ourselves AWARE. Awareness is in the NOW! What are potential hazards right now? As aviation maintenance

professionals, it is our duty to maintain complete situational awareness while performing our tasks. We must integrate MINDFULNESS in our maintenance practices.

Being mindful is the opposite of functioning on autopilot. The word “mindful” means to remember; it is awareness. It’s easy to forget to be mindful because it’s normal to be habitually lost in our own stream of internal thoughts. It is our brain’s habitual default mode. We have to make intentional efforts to keep ourselves aware and present. It takes mental effort and Practice!

Our mind naturally wanders from one thought to the next. We need to reel our minds back to the present and “meta-think.” This means to conscientiously think about what you are thinking, being aware of your awareness. Be cognizant of what you are doing and feeling. Try practicing often throughout your day; give your full sensory attention to seemingly mundane tasks.

Now transfer some mindfulness practices into our tasks as aircraft technicians. There are many techniques that can be used to personalize whatever works for YOU to keep YOUR mind on the task at hand. By all means, always use necessary checklists, have others check your work, and keep your training and skills up to date. But there are always going to be slips and gaps in our processes no matter how many times we’ve had human factors training. Again, our mind is our most important safety device. Develop your own Self-Aware Safety Nets. Integrate your own personal associations and memory techniques to “tag” your memories.



When performing a task, create an unassociated association to stamp or tag it into your conscious memory. For example, to reduce leaving FOD behind after a task, when you take tools and items onto a job, make a mental note of the number of items to stamp them into your memory. You take five rags/wrenches into a compartment; look at the number 5 on your watch or think of the song, “It’s Five o’clock somewhere...” to yourself.

You closed and fastened an inspection panel. Do you remember actually doing it? Again, create a conscious memory tag; Look at the time on the clock, or the tail number on an aircraft, or any random association and mentally acknowledge the event as you were securing the panel. Maybe rap the side of it two or three times, not to just ensure security of the fasteners, but to create a physical-to-mental association of completion within your memory.

Do you need to step away from an incomplete task for a moment and you had not yet applied torque to those nuts or connected those lines? There is always risk of getting sidetracked in the process. Leave incomplete tasks NOTICABLY disconnected, tie a rag, tag, or marker of some kind to it. Put a piece of tape on your left wrist or draw a small X on your right hand. Write a personal note to yourself in your note pad. Set a temporary alarm for yourself on your phone. Do anything that works for YOU to keep the event in the forefront of YOUR memory. And always, it’s best maintenance practice upon returning to a task, go back three steps from where you left off ensuring completeness. The idea of tagging memories is to code information using vivid mental images that provide structure of short term information. When there is a vivid association it’s easier to recall those memories when you need to.

In aircraft maintenance, there is little to no margin for error. We must always be vigilant in our daily tasks whether it’s on the ramp, in the hangar, or in the field somewhere; and always be mindful of the many lives that ultimately depend on your skills and abilities to keep them safe in the skies.

Human Factors – Making Good Decisions

Cathy Landry

Human Factors...a term we have heard in the aviation industry and continue to hear whenever an incident or accident occurs. Over the last several decades we have gained the ability to describe, dissect and analyze an occurrence to determine the root causes that provoked the negative outcome. Although much of the focus is on the technical issues, we also analyze the human aspect and determine where human behaviors have had an impact on an accident or incident.

Using this analytic information that we discover during accident investigation, we can identify potential improvements in systems and processes that could prevent error in the future. We can continue to improve the technical issues as well as re-enforce the understanding of human capability and limitations. This is a beneficial process, however, the information is obtained after an incident or accident has occurred.



Each year, as I evaluate what needs to be covered in a Human Factors training course, I know that reconfirming some basic human factor information and theory is beneficial but I also want to challenge learners to seek a higher degree of understanding. How do we enhance human factor training that focuses on a pro-active approach while continuing to build a deeper recognition of our individual

capabilities and the application of that capability in the work environment?

I have recognized there is a key area that we can focus on to enhance our level of human factor understanding. *Our ability to make decisions and the impact of our choices.* The topic of decision-making can be looked at from a technical perspective (troubleshooting) and an emotional perspective (human factors). We can benefit either way.

Decision-making is the thought process of selecting a logical choice from the available options. In aviation we have to adapt conventional decision making to help us work through troubleshooting and other issues that can impact safety.

Ask yourself - Do you agree that good decision making is important to ensure safety in aviation? If so, how many of us have always, 100% of the time, made the right decision?

Even though we unanimously agree that good decision making is important to ensure safety in aviation, we don't necessarily have the ability to achieve that all of the time. Many human factors can get in the way of making a good decision. It is important to understand what can impact our ability to make effective decisions. The more we know and understand, the better we will be at mitigating risk. Decision-making involves evaluating those risks and the impact a risk may bring to the work environment. It is important to consider which option has the most acceptable set of consequences, given the objective and taking into consideration the context of the situation.

Our choices are affected by several contributing factors that can impact a safety sensitive decision. Three key factors include:

- 1. Information processing** – Our ability to interpret information as we receive it. This is individual to each of us. Some people are slow to process, some need to over analyze, some may find certain information (problems involving math for example) easy to process while others may struggle to understand. Consider how you process information if there is a language barrier. Information processing can also be affected by fatigue, stress, attitude and mood.
- 2. Experience and knowledge** – As you know, the older you get, the more experiences you have added to your knowledge library. The individual who has worked on aircraft full-time for 30 years will be far more knowledgeable than the young person with three years of experience. But what if that younger person has spent three years doing a very unique task that the older person has never done? Experience and knowledge are unique to each individual and have a bearing on how we make decisions.
- 3. Situation Awareness** – A simple definition is “awareness of the situation you are facing”. There are varying levels of situation awareness and the key is

making sure you have enough information to make a decision.

In the aviation industry, we find that information on Aeronautical Decision-Making (ADM) is focused on decisions made in the cockpit by the pilot as they operate the aircraft. One ADM theory that could also work for other aviation workers including maintenance technicians is the DECIDE model.

Obtaining information and balancing that with the complexity of the decision can be tough. Use the DECIDE checklist to help you work through the decision-making process.

Aviation is a complex system that requires each person to always do their best in communicating, gathering information and making the best possible decision, often under stress, pressure and other contributing factors. Those factors that can impact us as individuals could also affect a group when making a team decision.

Learning how to improve decision-making skills, understanding how our decisions can impact safety, and improving communication with others, are all strategies to take our human factors training to the next level. Increased awareness, knowledge and skill will serve to mitigate risk and improve safety.

D- Detect	Gather all facts and information about the event — what still works and what does not.
E - Explore	Assess and form an understanding of the situation. Have you seen something similar? Consider possible solutions, explore your options. Ask others.
C - Choose	The safest practical solution.
I - Identify	The actions necessary to carry out the safest option. Have you done this before; what are the expected outcomes?
D – Do	Act and communicate to others that action (written or verbal).
E – Evaluate	Any changes due to the action; reassess the situation, revise if necessary.

Figure 1. The DECIDE checklist.

Red Means... Go?

MSgt. George Dunseath

Sight is such a blessing and often a sense taken for granted. At times, even subconsciously, our eyes focus and refocus, facilitating thought and simultaneously enabling mind and body to activate in precise ways a machine will never be able to duplicate. In short, the intricacies in which the naked eyes operate are nothing short of profound in their own right.

It can be said that what makes sight such a valued commodity is not the actual vision itself, but instead the after action. In some cases, sight can act as the gateway that signifies the difference between life and death. Due to this disparity, it is no coincidence that life-saving objects such as fire hydrants, stop signs, and exit signs in buildings and aircraft alike are all easily identifiable with the color red.

Following suit, and in decades past, the color red was used in reports to highlight where the United States Air Force was deficient in imperative areas. Unfortunately, such transparency displayed in showing red rendered negative connotation. Instead of receiving assistance or resources to correct where a unit was deficient, commanders and their respective units alike received pessimistic assumption parallel to the adage “association breeds similarity”, suggesting that the color red identified towards a shortfall was to be associated with the unit itself. This left commanders having little faith in rectifying deficiencies through a self-assessment program that mandated transparency. Commanders would have to cautiously consider showing red in reports. After all, seeing is believing...or is it? Have knee-jerk reactions rendered us handcuffing ourselves?

This brings us to current day, where the Air Force is encouraged to “Embrace the Red” in such Major Graded Areas such as: Managing Resources, Leading People, Improving the Unit, and Executing the Mission. This notion suggests that if we properly self-assess ourselves with integrity that we can emotionlessly vector efforts to attain resources to ultimately rectify deficits. This seems like an easy concept to grasp with proper ethics. However, unless we release the egoist ways of pointing a finger at a person instead of a problem, these issues would remain systemic in years to come. Thank goodness, commanders are now (in unison) convinced to show inadequacies without ramification. No longer do they have the fear of what label they will inherit after “Embracing the Red”. Or do they?

George Santayana, philosopher and poet once said, “Those who cannot remember the past are condemned to

**“Those who cannot remember
the past are condemned to
repeat it.”**

George Santayana

repeat it”. The United States Air Force is not a perfect enterprise by any stretch. Admittedly, we have quite a ways to go to meet optimal productivity while playing an integral part in the nation’s defense. However, with the majority of its leaders opting for ethical solution and conviction, despite what assumptions may follow, it promises the unveiling of a brighter future of a military branch with optimal ethical courage. Now that we have learned to embrace the red, off we go!

Are You Willing, or Are You “Just There”?

John Paonessa

When you arrive to work, are you ready and willing to take on the responsibilities as an AMT, or are you “just at work”?

How familiar are you with the Mechanic’s Creed? As an AMT, you should have read it many times; it may be hanging up in your work area. If you haven’t read it lately, take a few minutes to re-read it. Do you live by this when you perform maintenance, or are they just a bunch of words to you?

We must always stay professional, and never forget there are people, even whole families who unknowingly put their complete trust in our abilities to ensure their trip will be a safe one each time they sit in a seat.

As AMTs, we are always having to balance what can and cannot safely fly. It’s a continuous challenge each time we arrive upstairs to the flight deck to address a problem. Never take lightly your decisions, as the work you perform and how it is accomplished affects many people whom you will never know.

Are you willing to accept the responsibility for the lives which are entrusted to you when you walk on that flight deck? Are you willing to say “no”, if the aircraft is not in an airworthy condition, and are you willing to take a stand

that you will not be persuaded to release it because of pressures, both internal and external?

When we let others pressure us, or put undue pressure on ourselves to hurry to get the job done as fast as possible we tend to take short cuts. We think a little short cut here and one there, which has worked for us in the past, is ok. Eventually, this becomes a habit we are willing to accept, and we continue to do it. The possibility of this is that eventually we will take one too many shortcuts, and it could have serious or catastrophic results.

Before you start a task, ask yourself the following questions: Am I ready to work? Am I distracted by any problems, either at home or at work? Am I familiar with this task? Do I have the correct manuals or task cards? Do I have the required equipment? Are the correct parts being used?

When performing a task and it seems there are many issues with it, STOP! Do some research; there may be something that is warning you. Sometimes you need to “trust your gut”. Take a step back, and check to make sure all your equipment and the paperwork is correct for the task. If the issues continue, check with your lead or supervisor. The problem may need to be elevated to engineering for clarity, or to have an EA written, or

rescheduled for another location with the proper equipment. If we don't have what's needed to complete the task at one place, do not do a "work-around". It's not worth the chance for injury of personnel, damage to the aircraft, or both while trying to "get it done!"

I say this because in my 12 or so years as a Union ASAP Representative, some of our events have some common themes: distraction from the task at hand, missing steps in paperwork, not paying attention when performing a task, or not completely clearing an aircraft before moving flight controls, just to name a few. We see and hear some of the same things over and over: "I didn't notice," "I was

hurrying to make the gate time," or "I read over the card, but missed the step." It only takes a second to have something happen that could possibly have a permanent result.

After you finish with your maintenance and before walking away, do you check to make sure all of your tools, hardware, and other items are accounted for? If you don't, this is a habit you need to change. The last thing we want is an item flying around behind a panel, a pylon, or inside an engine cowl to name a few places for example, and end up somewhere it shouldn't be, causing a problem... or worse. Don't let distractions prevent you

from doing your maintenance correctly. If you are working, and you become distracted, go back a few steps and ensure you complied with all past steps. When preparing to leave the aircraft, ensure ALL of your tools, and any FOD is accounted for! Make it a habit to practice good tool control, and clean up after yourself.

When working with a coworker as a team, take some extra time and check each other's work. A second set of eyes will never hurt, and something not safetied, or a clamp not tightened might be caught.

As professional AMTs, we need to keep ourselves ready to do our best, each and every time. We need to pay attention to what and how we complete each task at hand. The flying public, as well as the flight crew, are depending upon you to be at your best at all times, and to perform each and every task completely and safely. You are a major component in the continuing cycle of ensuring the aircraft you perform maintenance on is in a safe and airworthy condition each time, every time! So when you arrive to work, are you ready and willing to take on the responsibilities as an AMT, or are you "just at work"?

For more information regarding the Mechanic's Creed, please visit https://www.faa.gov/safety/programs_initiatives/operations_support/documents/mechanic_creed

Mechanic's Creed

Upon my honor I swear that I shall hold in sacred trust the rights and privileges conferred upon me as a certified mechanic. Knowing full well that the safety and lives of others are dependent upon my skill and judgment, I shall never knowingly subject others to risks which I would not be willing to assume for myself, or for those dear to me.

In discharging this trust, I pledge myself never to undertake work or approve work which I feel to be beyond the limits of my knowledge, nor shall I allow any non-certificated superior to persuade me to approve aircraft or equipment as airworthy against my better judgment, nor shall I permit my judgment to be influenced by money or other personal gain, nor shall I pass as airworthy aircraft or equipment about which I am in doubt, either as a result of direct inspection or uncertainty regarding the ability of others who have worked on it to accomplish their work satisfactorily.

I realize the grave responsibility which is mine as a certified airman, to exercise my judgment on the airworthiness of aircraft and equipment. I therefore, pledge unyielding adherence to these precepts for the advancement of aviation and for the dignity of my vocation.

Other HF Resources and Links

Click the icon for more information

Follow Procedures: The Buck Stops with Me



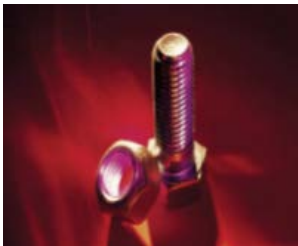
FAA Training Tools and Resources



Aviation Human Factors Industry News by
System-Safety.com



Nuts and Bolts Newsletter



Aircraft Maintenance Technology



Aviation Maintenance



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FAA and Industry General Aviation Awards



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