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Inside This Issue

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Our Request and Promise to You

Want to share an article, experience, or provide suggestions for the FAA Aviation Mx HF Newsletter?

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!

ICASAS: August 2019

The Amity School of Engineering and Technology, AUUP - Lucknow Campus, organized an international conference on 'Airworthiness and Safety of Aircraft and its Systems and the Challenges Ahead' on 28-29th Aug, 2019 at its campus.

The conference materials included videos on Human Factors developed by the FAA, which can be found here: www.humanfactorsinfo.com

Check out some of the ICASAS highlights here!

For more information about ICASAS, please visit http://icasasamity.in.

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.

72nd International Air Safety Summit
Taipei, Taiwan (November 4-6, 2019)

Blue Angels Homecoming Air Show
NAS Pensacola, Florida (November 8-9, 2019)

Safety and Flight Ops Conference
Baku, Azerbaijan (March 31-April 2, 2020)

Military Aviation Logistics & Maintenance Symposium
Dallas, Texas (April 28-30, 2020)

Author Appreciation

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.

Editor's Comment

We have all listened to, or described, an aviation event for educational or motivational purposes. We usually apply the story to maintenance actions, human factors, or other safety issues. We adjust the story to the audience. Well, the speaker at this year's MBA End-of-Course Ceremony at the University of Oxford Saïd Business School took a much broader view. He discussed general leadership lessons from aviation for the corporate world and beyond and the pursuit of purpose and meaning. He talked about teamwork, grit, initiative, culture, duty of care, and commitment to one another, to our organizations, and – above all – to those whom we serve. The message was very clear and powerful, because it came from "real life" events, and it shows aviation professionals at their very best. The speaker was Dr. Marc Szepan, former airline executive, current University of Oxford Saïd Business School faculty member, and frequent/current contributor to this publication. Read his article about the "The Four A's" in this issue. Then, click this YouTube link to hear Dr. Szepan's address: https://www.youtube.com/watch?v=IfvRFSk7Vh8.

Meet the Authors

Dr. Marc Szepan

Dr. Marc Szepan is a Lecturer in International Business at the University of Oxford Saïd Business School. Previously, he was a senior executive at Lufthansa. His primary professional experience has been in leading technical and digital aviation businesses in Europe, Asia, and the U.S. Most recently, he served as Senior Vice President, Airline Operations Solutions, at Lufthansa Systems, the IT services business segment of Lufthansa. He also held leadership roles at Lufthansa Technik, the MRO business segment of Lufthansa, and for two other German industrial companies. In 2012, Marc was recognized as one of *Aviation Week & Space Technology*'s "40 Under Forty: Rising Stars of Aerospace and Aviation". Marc received a doctorate in Management Studies from the University of Oxford. He also holds an AM from Harvard University and an MBA from Duke University.

MSgt Steven Fleming

MSgt Steven Fleming has been serving the United States Air Force for almost 17 years. Currently, he is assigned to the Wing Inspector General Inspections Office at Tinker Air Force Base in Oklahoma. Throughout his career, he has been to multiple locations across the world and has been certified to lead maintenance efforts on C-130's, F-16's, KC-135's and AWACS aircraft.

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.

Vishwanath Hampanna

Vishwanath Hampanna is an Engineering graduate and a post graduate in Human Resources. Currently he is associated with TATA SIA Airlines, Ltd. India as an Instructor in aircraft maintenance, human factors and Safety Management Systems. With 30 years of experience in aviation maintenance training and other industrial training establishments, he has developed interest to understand human behavior in the aviation maintenance environment and has conducted several human factors and Safety Management System training sessions for engineers, technicians, and CRM team of pilots and cabin crew. He is committed to drive the importance of safety attitude within an individual thus creating a safe working environment in the organization.

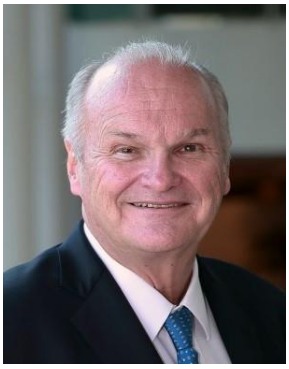
Kylie N. Key

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 risk-based, complex scenarios; social and cultural values that affect workplace safety and behavior; and statistical/computational models of cognitive phenomena. She is currently completing her final year in the Cognitive Psychology PhD program at the University of Oklahoma.

Levi L. Breeding

Levi L Breeding is United's corporate LOSA manager with responsibilities of program oversight, promotion, and data reporting. His 20 years of experience in the industry is underpinned by an array of roles beginning with front-line experience as a flight attendant. Levi is currently pursuing a graduate degree in Industrial-Organizational Psychology to solve workplace issues as they relate to employee injuries, asset damages, and instances of non-compliance and non-conformance.

Dr. Bill Johnson



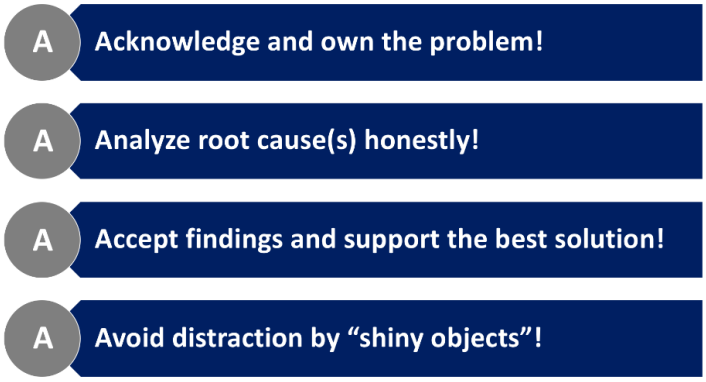
Dr. Bill Johnson, a frequent contributor to this newsletter, is the FAA Chief Scientific and Technical Advisor for Human Factors in Aircraft Maintenance Systems. His comments are based on nearly 50 years of combined experience as a pilot, mechanic, airline engineering and MRO consultant, a professor,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

What Aviation Leaders Can Do to Fix Safety and Quality Problems

Dr. Marc Szepan - University of Oxford Saïd Business School

Even the best aviation businesses can encounter safety- and quality-related challenges and even the best aviation professionals can make mistakes. One of the hallmarks of a world-class aviation operation is not the absence of errors, but the willingness and ability to recognize and correct safety and quality problems. It is incumbent upon aviation leaders – and those of other safety-critical businesses – to provide decisive leadership to ensure that appropriate corrective and preventive actions are taken once a business finds itself in safety- or quality-related turbulences. This article suggests four leadership best practices – the **Four A's** – for fixing safety and quality problems.

Four A's for Fixing Safety and Quality Problems



Acknowledge and own the problem!

Admission of individual or organizational errors tends to be one of the most vexing challenges in most businesses. This can apply even more so to successful companies that take pride in a demonstrated record of operational excellence or that define themselves by virtue of commitment to a "zero defect" culture. When things go wrong, the first reaction often is denial or qualification along the lines of "This must be a misunderstanding!" or "This is not too bad!" It is worthwhile emphasizing that excellence in aviation is not a function of the absence of mishaps but of the willingness and ability to recognize, learn from, and correct problems. Individual or organizational errors can occur even in the most successful and admired organizations. Aviation leaders would be well-advised to admit and own mistakes, be they individual or organizational. Denying, deflecting, qualifying, excuse-making or blame-shifting – let alone covering up – are unlikely to be helpful solutions to safety and quality problems and instead are likely to set the wrong tone in any organization.

Analyze root cause(s) honestly!

Even when leaders properly acknowledge and own a given safety or quality problem, at times, there can be the temptation to engage in what one might term "pro forma" or "politically expedient" rather than honest root cause analysis. Analysis of the root cause(s) of a given safety or quality mishap should be driven by facts and truths, no matter how inconvenient, and should not be subordinated to pre-determined outcome preferences. Non-data-driven guesses and feelings, an organization's desired self-image or reputation, and company-internal or -external politics such as organizational rivalries or future sales considerations are bad drivers of any root cause analysis. Also, especially otherwise successful aviation businesses need to remain vigilant with regards to inadvertent analytical bias driven by "Not Happening Here" (NHH) syndrome (see also "How to Maximize Opportunities to Learn from Accidents" in the FAA Aviation Mx Human Factors Quarterly March 2019 issue). Lastly, some commercial agreements do not spell out contractual ramifications for all quality eventualities. Foregoing in-depth analysis by invoking lack of contractual details along the lines of "But this issue is not covered in the purchase agreement!" is not a recommended approach for learning from mishaps.

Accept findings and support the best solution!

Once the root cause of a safety or quality mishap has been identified, appropriate corrective and, if applicable, preventive measures need to be devised and put into place. Aviation leaders should accept findings no matter how inconvenient and champion implementation of substantial corrective and preventive measures rather than of superficial band-aids. In the context of developing

the best solution for fixing an identified problem, the importance of leadership humility can hardly be overemphasized. In general, the C-suite does not have a monopoly on good ideas. However, in many an organization, potentially game-changing ideas fall victim to "HiPPO syndrome"; that is, the tendency to defer to the Highest Paid Person's Opinion rather than to adopt the objectively best solution for a given problem supported by data regardless of its originator. Aviation leaders need to maintain a personal leadership style and an organizational culture that at least mitigate the risks of "HiPPO syndrome" and support the best solution. Last but not least, it is worthwhile remembering that effective implementation of corrective and preventive measures tends to be a function of visible leadership support of the best solution, creation of broadly-based organizational agreement, and availability of sufficient personnel, financial, timeline, and other resources.

Avoid distraction by "shiny objects"!

When pursuing significant improvements in terms of organizational performance, it can be tempting to favor presumably "fancy" and "innovative" over "boring" and "old-fashioned" solutions. Cutting-edge management tools such as artificial intelligence, data analytics, digital transformation, LEAN, and Six Sigma should be integral components of the general tool box of modern business leaders. However, leaders of aviation businesses need to ensure that corrective and preventive actions are appropriate solutions for the safety or quality problem at hand and their underlying root cause(s). In some cases, one of the aforementioned cutting-edge management tools might well be the optimal solution for a certain safety or quality mishap. In other cases, more "old-fashioned" approaches can be perfectly appropriate, if not even more useful and/or more cost-effective. For example, not every case of FOD left behind in a fuel tank requires resolution via a cross-enterprise digital transformation project. Aviation leaders need to exercise sound judgment with regards to the risks of being distracted by "shiny objects", especially when getting "old-fashioned" operational basics right can be a more effective and efficient response to safety or quality mishaps. Lastly, aviation businesses need to beware of the fallacy that general cultural or leadership issues lend themselves to be "fixed" via employment of specific digital or data analytics-based management tools alone.

Even world class aviation businesses can encounter safety or quality turbulences. One of the hallmarks of aviation excellence is not the absence of errors. Instead world class aviation businesses distinguish themselves – amongst other characteristics – by the willingness and ability to identify and correct safety and quality problems. Recovery from safety and quality mishaps is therefore a key skill that aviation leaders should command. The Four A's suggested in this article are meant as a potentially helpful managerial tool to guide leaders of aviation and other safety-critical businesses in their quest to fix safety and quality problems.

How Does a Golden Bolt Reduce FOD?

MSgt Steven Fleming

What is FOD?

Throughout this article, I will describe how small incentives can promote both safety and morale, at the same time, within a maintenance unit. I will discuss one program specifically: identification and reduction of FOD. First, what is FOD? Foreign Object Debris happens from items left in areas they were not meant to be in. FOD damage can happen from tools, hardware, garbage, and even natural items such as rocks and branches. FOD damage is a serious issue that we, as aircraft maintainers, have a responsibility to prevent.

How to reduce FOD?

In different maintenance units I've worked at within my career, I've seen many variations on how to prevent FOD. For starters we are trained on many procedures, including proper tool control, work area cleanliness, and overall housekeeping. After every job we do, we are required to inventory our tool box to maintain accountability for all assigned items. Immediately before and right after the aircraft taxis in or out of its assigned parking location, we perform an "area inspection" to identify FOD. We perform this task to prevent potential damage to an aircraft. Of course, we are constantly inspected to ensure we are following our training with each of these specific tasks. Despite the tedious tasks towards the end of work

days, morale remains a must, therefore it's important for us to find ways to insert a little fun.

How does a golden bolt reduce FOD?

Overall, my favorite example of turning everyday requirements into a fun situation must be the "Golden Bolt". On a scheduled basis, we would line up and walk together in uniformity along the flight line and all search for FOD. This would normally happen 2 or 3 times per week. Expectations were clear; everyone at work at the specified time attended the fan-favorite "FOD Walk". Now, I'm not going to pretend that we all loved this mundane task. In fact, we openly acknowledge there are always other things we need to do such as sign off jobs in the data system, take out trash, and to be transparent, sometimes we just wanted to go home. But, when dealing with aircraft, FOD is serious, and potentially life threatening. Therefore, no matter what "excuses" we had not to participate, at the end of the day we all have to play our part to increase safety.

To expand, we had an individual that was assigned as the "FOD Program Manager". He/she was normally assigned in the quality assurance department. During one of our lovely FOD walks, that program manager had a little trick up his/her sleeve. The manager would hide a "golden bolt" in a specific location with hopes that it would be found by one member on the required FOD walk. The program manager identified a location based on different factors. Sometimes, it was just an area that was easy to skip past. At other times, the manager knew of an incident caused from FOD and wanted to verify that we would be able to correctly identify that area as necessary in a timely manner. Of course, all of this was with the full support of the commander in charge.

Now, before I go further, I must point out a few things…

1. The FOD program manager was not randomly given the job. They were trusted and hand-selected. Hiring for that role is a specific process, usually involving supervisor recommendations and unit commander acceptance.
2. Yes, this bolt was literally spray-painted gold. The manager would take pride in how gold this bolt was. There was no missing it, and the glare alone should blind anyone looking in its general direction.
3. I use the word "hide" loosely. Due to the potential damage of someone not finding it, the program manager had constant eyes on the location of where he/she placed the bolt.

Now, back to the walk. Try to imagine you are walking down the flight line with your ear protection donned. Within your immediate workspace are running engines to keep you cognizant of your purpose behind your task. You carry your small plastic trash bag for any FOD you may find; you are kind of in your own little world while scanning the area you are responsible for. All the sudden, out of nowhere, you hear a friend screaming and yelling. You can't hear much due to your ear protection. Still, the screams are loud enough that you can hear. However, it is apparent that this is a different kind of screaming. Not such that would startle you and have your defenses up. Instead, in an instant, you feel both happy and sad at the same time. Your friend has his hand held up high, with the sun reflecting off that extra bright golden bolt. Then, reality strikes; you missed it again! You searched for the bolt every time you go out to no avail, but now your friend gets to return the golden bolt to his supervisor in exchange for our most highly sought after reward--an extra day off. Lucky for him, but you still wish it was you that found the bolt. So now what? Now, you are motivated. No way is your friend going to find it again before you next time. You hone your vision and go out further prepared to look for FOD anywhere you can. You do so with such energy, leaving no stone unturned in hopes to find that rare, elusive, golden bolt to hold proudly in the presence of your peers as they watch you exchange it for that well-deserved day off from work.

Party of One? How to Do a Safety Culture of Just You

Sabrina Woods

A flight crew for a Part 135 operation found a main landing gear bolt broken on their preflight inspection. They immediately reported it. A few weeks later, in the same operation on a different aircraft, an A&P found a bolt completely missing from a main landing gear. He reported it. A few months after that an aircraft experienced a catastrophic failure after landing when ALL SEVEN BOLTS from a main wheel failed, causing the tire to deflate and the wheel to separate. Enough was enough. In a massive coordinated effort, the operator's principal airworthiness inspector, in conjunction with the aircraft certification office, researched, penned, and pushed a safety recommendation initiative to identify, uninstall, and recall all bad bolts. Not just on their own fleet — realizing that there were several other potentially affected Beech Jet 400s out there, they took it a step further. Because of the team's hard work and commitment to safety, they got all of the bad bolts out of the supply system and they did it in record time.

This effort — *these people* — have what I would call a darn good safety culture.

What exactly is that you might ask? "Safety Culture" is usually defined as a collection of beliefs, perceptions and values that people share in relation to the risks that exist while doing business. It is what each person believes about the importance of safety and how he or she contributes in light of that belief. It is about understanding what risks are associated with the job, and what your responsibility is regarding that risk.

Safety culture, in and of itself, does not have a distinct classification. An organization or person can have a "bad" or "weak" safety culture just as readily as it can have a "good" or "strong" one. It is all about what the people believe and put in to it that gives it its alignment. Many tragic accidents have occurred, in part, because of the lack of an effective safety culture. Complacency, poor decision making, workarounds, failing to follow procedures or checklists, a reluctance to communicate concerns, and failing to respect human limitations are all hallmarks of a bad or weak safety culture.

What are the Hallmarks of Good Safety Culture?

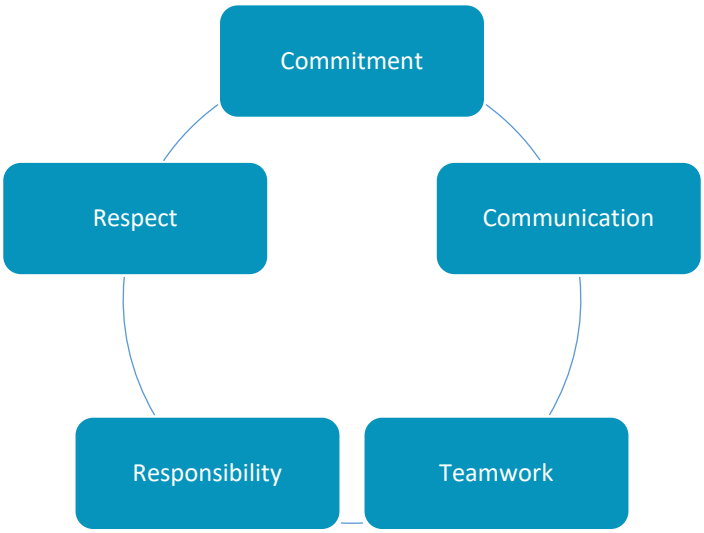
Commitment. First and foremost, a good safety culture is dead in the water unless there is a solid commitment to it. Building and sustaining a safety culture is not just about nodding along at the points that seem reasonable and make sense. It is about applying action to the words. In aviation, it is about being concerned for the outcome of each flight and doing whatever is necessary to ensure the aircraft is airworthy every time.

Communication. You can always tell how well an organization is running by how it communicates within itself. Is communication effective — from those in charge, to the employees, and back again? Does everyone know and understand what the goals are, and do they know if they voice a concern it will be listened to?

Teamwork. Safety works best if everyone involved feels like they are on the same team. No one likes it when they feel like they have no say in what happens to them. Everyone — Big Boss to Worker Bee — has to be onboard and have buy-in for a safety culture to remain effective. If everyone on the team works towards the goal, everyone can benefit from the results.

Responsibility. With great safety comes great responsibility. Everyone in the organization has to have a sense of empowerment and accountability when it comes to identifying and managing risks. It doesn't do anyone any good if hazards are walked right by, day in and day out, without anyone feeling as though they ought (or are allowed) to do anything about it.

Respect. A safety culture is nothing unless there is healthy respect. Respect for the hazards and risks that are associated with doing business in the organization, and respect for the limitations of the human mind and body.



Just a Party of One?

By now you might be wondering: *Sounds good. But what does this safety culture thing have to do with me? I'm just one person and hardly an 'organization.'* Totally valid, but I have news for you. You ARE an organization! Even if you largely work alone, you are part of a bigger, more dynamic whole.

Hopefully…

- You rely on accurate write-ups or conversations with the pilot to better understand how the aircraft is performing and what it might need.
- You chat with other A&Ps or technicians to "bounce ideas" off of or garner better insight into those tricky fixes.
- You consult and engage in technical and safety forums such as this one to keep up on the latest changes, advancements, and safety topics across the field.

Every one of these aspects and every person you interact with is part of your "organization of one," and therefore part of your safety culture. Together, you all keep the aircraft airworthy and flying safe.

How do You do Safety?

So since safety culture is a collection of beliefs, perceptions and values — what do you believe? How do you think a safe operation should go and how should everyone involved conduct themselves?

Creating a strong culture is a matter of applying the good hallmarks in your organization. It is about staying engaged with all of the latest and greatest airworthiness news. It is about chatting with your fellow mechanics about experiences you have had and lessons you've learned. It is about "seeing" it and "saying" it when something you encounter doesn't seem quite right. And lastly, it is about appreciating the fact that safety is hard work. It has to be nurtured and cultivated just like any living thing does.

Stop Maintenance Error Leaks Through RVP Steps

Vishwanath Hampanna
B.E Mech, Master of Management Studies (Human Resources)
Currently working as Instructor 'B1' with TATA SIA Airlines Ltd. India

This article is written in memory of the late Rohit Virendra Pandey, Maintenance Technician, who lost his life during aircraft maintenance on July 9th, 2019 at Kolkata airport in India. My friend's initials RVP, have been transformed into steps that I believe will trigger us to remember warnings and cautions during daily aircraft maintenance activities.

The primary objective of aircraft Maintenance activity is to work safely and to keep aircraft airworthy.

Each working day, maintenance personnel follow a routine with occasional deviations from normal work duties. Maintenance personnel may encounter technical snags on the aircraft or discover parts that require troubleshooting or repair before the aircraft returns to service. Maintenance errors have contributed to flight delays, engine shutdowns, injuries and fatal accidents. While there are a number of individual, situational and organizational factors that contributed to those events, some of the errors are due to ignoring the cautions and warnings mentioned in AMM (aircraft maintenance manuals). When maintenance related incidents or fatal accidents are reported, the organization attempts to mitigate the maintenance errors through safety briefings and corrective actions to stop the error leak, if any exist. This will place the maintenance environment on high

alert for some time. But the intensity of the alert level will decline exponentially within a few days. Slowly over time, the tightened grip over the maintenance error tap will loosen, and the error tap once again starts to leak.

Safety Training

The aviation maintenance environment has brought a lot of attention to safety culture. This includes carrying out the maintenance job using AMM procedures, following warnings and cautions associated with the procedures, HF (human factors) training focused on the Dirty Dozen and their safety nets, training using in-house circulars, notices, work hazard reporting by the SMS (safety management system), and other operator experiences and manufacturer inputs. All of these, to some degree, have been successful in reducing the maintenance error leak.

The aircraft can neither automatically nor biologically repair itself like the human body. It always requires a human interface. Human behavior is complex and at times, the human mind and body may not work together to follow safety procedures, even with existing safety nets. This applies even to individuals who are working within a team. In such a scenario, human errors are more likely. The errors and resulting consequences may not be proportional, and at times may prove fatal and costly.

Stop the leak

Stopping such maintenance errors through existing safety nets can reduce human errors. Maintainers and managers need to maintain awareness regarding complacency between the system and the individual to avoid an increase in the leaky maintenance error tap, resulting in multiple minor errors that converge and become a major incident/ accident.

Maintenance organizations can focus on reducing error by conducting HF training, issuing circulars or notices, and through hazard reporting systems. Reducing error requires the safety culture to evolve at all levels within the organization, management, supervisors, maintainers, and trainees. Otherwise, the safety culture could remain poor or voluntary on an individual bases and organizational measures may become a one-way communication without proper safety results.

What safety options are available to the maintenance organization? While exploring all possibilities to stop the error leak, we come back to review the safety culture of the organization and individuals' commitment toward safety. Safety culture starts within an individual. It may be increased by the organization, but the organization cannot physically check the individual and team every day for adherence to safety policies and procedures. This would require additional resources and management commitment. Spot checks and audits are useful but may not nurture safety culture within an individual.

RVP: Read, Verify, and Practice

In the interest of establishing a safe maintenance environment, one must understand safety is about the attitude and commitment. The individual and their team can take up simple RVP (Read, Verify, and Practice) steps before commencing maintenance activity to stop the maintenance error leak.

RVP steps for maintenance activity:

- **R**
  - **R**: Read warnings and cautions before each maintenance activity.
- **V**
  - **V**: Verify that your coworkers or team members also follow warnings and cautions.
- **P**
  - **P**: Practice following warnings and cautions all the times.

The supervisor, group leader or an engineer should encourage team members (maintenance personnel) to read the warnings and cautions during the safety pre-brief session before starting daily maintenance activities. These safety pre-brief sessions about warnings and cautions are captured in **fresh memory** and play a vital role while carrying out maintenance activities safely. The team now has a fresh reminder of possible unsafe conditions through warnings and cautions as mentioned in the AMM procedures. Even if one of the team members deviates slightly, other team members can catch and correct it. This forms a safety chain and aids in stopping the maintenance error leaks. This also provides quality assurance among coworkers and team members.

The safety pre-brief sessions carried out daily to highlight safety will become routine and help nurture the safety culture in both the individual, team, and organization.

Safety pre-brief sessions can be used to highlight the importance of warnings and cautions every day. Issues arise and these can be missed occasionally due to work pressure, lack of time and resources. Adopting other safety defenses through audits and spot checks is another option. However, maintaining a consistent safety culture is key to stopping and preventing maintenance errors.

"Safety culture… must evolve throughout the organization, the team, and oneself. It cannot be pulled out from an individual by the organization each day"

We must realize and accept that we are all a part of *safety culture and it must evolve throughout the organization, the team, and oneself. It cannot be pulled out from an individual by the organization each day.* To improve safety culture, implementing these simple RVP steps can aid individuals and their teams during maintenance activity. These steps will provide means to stop the maintenance error leak from the tap. This would go a long way in making the maintenance environment clean and safe.

Reminder about FAA Safety Promotion Tools

Kylie N. Key

If you read the other articles in this newsletter, you probably noticed the theme of organizational culture. A positive safety culture is arguably the #1 ingredient needed to ensure the safety of aircraft (like the recall of bad bolts in Woods' article) and employees (to prevent injuries and loss of life of technicians like the RVP steps suggested by Hampanna). Safety requires the commitment of everyone, every time--that is a good safety culture. But how do we get there? Promotion, of course. Safety culture must be promoted frequently, with salient, attention-grabbing reminders that safety matters more than anything else!

This article serves as a brief reminder of example FAA safety promotion tools, all of which can be found on the Human Factors in Aviation Maintenance website, https://www.faa.gov/about/initiatives/maintenance_hf or at www.humanfactorsinfo.com. These tools are derived from FAA-sponsored research on aviation maintenance human factors (HF) issues, meaning they are all scientifically-validated, and they are also designed to be user friendly and free.

General Maintenance HF Education

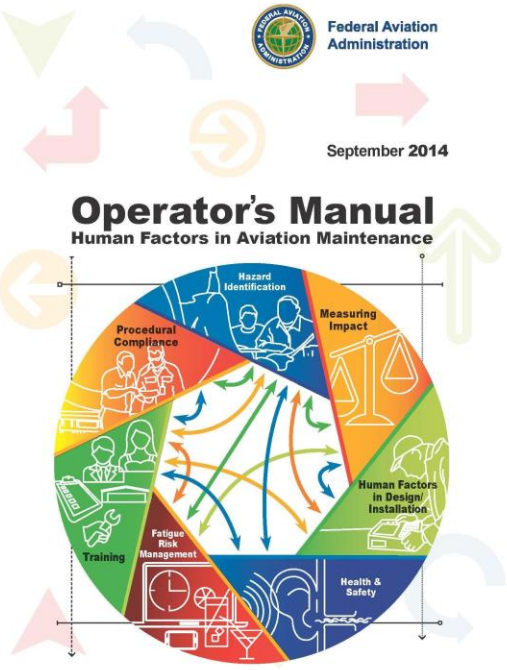
https://www.faa.gov/about/initiatives/maintenance_hf/training_tools/

Maintenance Human Factors Presentation System. This provides an introduction to HF and its role in aviation maintenance. Many people are already familiar with this "Dr. Bill" presentation, a variation of which is used at his frequent maintenance human factors seminars for the Transportation Safety Institute. This provides support for instructor-led PowerPoint presentations focused on HF, and it is extensively used throughout the world.

Trade Publications. Industry-published documents about all things aviation maintenance, including *Aviation Pros*, *Aviation Today, and Decoding Human Factors*. New content is published weekly or monthly on their sites.

The Operator's Manual for Human Factors in Aviation Maintenance. Everything you need to know about HF in maintenance and ground operations. This document, jointly developed by the FAA and industry, won the FAA Administrator's *Award for Use of Plain Language* in

2006. Find it here: https://www.faa.gov/about/initiatives/maintenance_hf/library/



Tools for Specific HF Issues

Fatigue Countermeasures Training. This training course includes information on fatigue, fatigue countermeasures, sleep, and a course exam. It also includes the popular "Grounded" video. Find it here: https://www.faa.gov/about/initiatives/maintenance_hf/fatigue/ or www.mxfatigue.com

Grounded Video. This video depicts the severe consequences that fatigue can have for us mentally, physically, and emotionally. Fatigue can slow reaction time, impair decision-making, and make us take risks (like committing unsafe behaviors) that we normally avoid. The best path to the video is: https://www.faa.gov/tv/?mediaid=400

Fatigue Posters. A set of PDF printable posters designed to improve awareness about fatigue-related issues. Download at: https://www.faa.gov/about/initiatives/maintenance_hf/fatigue/multimedia/

Follow Procedures Computer-Based Training. This 30-45 minute training course reminds learners that everyone in the organization is responsible for safety--no more "passing the buck". This means following procedures, every single time, even though it takes a little longer than shortcut methods. It also means reminding others about the importance of safety when they forget or pressure you to rush. The training suite also includes practice on 11 safety champion tools, an end-of-course knowledge check, a safety champion pledge, and before-and-after task cards. (Go to FAASafety.gov or to www.followprocedures.com)

Follow Procedures Before-and-After Task Cards. These cards serve as reminders of important and necessary steps to complete before, during, and after work tasks. There is a version for maintainers, supervisors, and procedure writers. These will be added to the Human Factors in Aviation Maintenance website in the near future for download and will be available in multiple sizes for printing as posters.

The Believers, Achievers and Dreamers: People are the success of LOSA

Levi L Breeding

In 2018, United Airlines' executive leadership team formalized how our more than 90,000 teammates worldwide interact with customers and each other through the principles of **core4**. The four elements that comprise **core4** – Safe, Caring, Dependable, and Efficient – are placed in hierarchal order to help guide operational decisions. At United, safety is at the top of the list and at the forefront of the enterprise.

A portion of the Safe element resides in United's various safety programs – headed by Corporate Safety Vice President Michael Quiello – including the Line Operations Safety Assessment (LOSA) program. United's LOSA is a predictive program that is complementary to the multi-division Aviation Safety Action Program (ASAP), which assimilates potential safety issues identified by our employees throughout the system. The LOSA program quantifies those issues as threats and errors in the

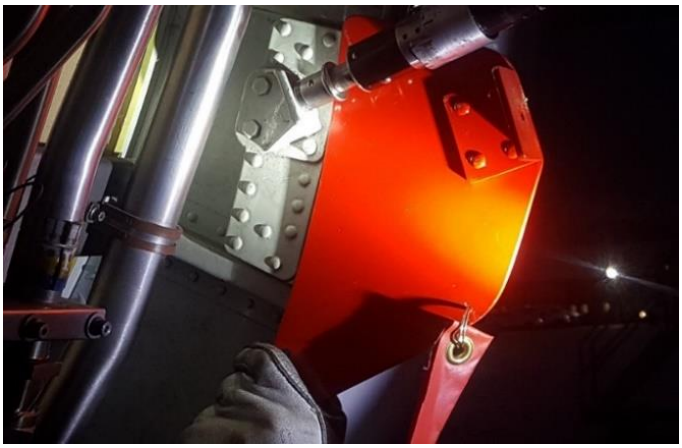
737 tire change kit designed to keep required tools together. Property of United Airlines.

airline's daily operations through voluntary and anonymous peer-to-peer observations. These core programs are integral to United's suite of safety programs that comprise the aggregate safety management system (SMS). Currently, the Corporate LOSA team supports 12 LOSA programs across five divisions: Airport Operations; Flight Operations; Network Operations; Catering Operations; and Technical Operations. The Technical Operations division supports the Maintenance LOSA (MLOSA) program for its line operation and is expanding to its hangar operation this year. The MLOSA program at United was reinvigorated in 2016 and is active at 13 stations across United's system. Over the past two years, MLOSA observers completed more than 40 times the observations compared to the year of its inception. For the first two quarters of 2019, Technical Operations LOSA observers have completed a combined total of over 20,700 assessments of various work processes in the operation. This substantial body of work has established a solid and valuable data stream into United's overall SMS. United's MLOSA program is fueled by very dedicated technicians.

Boeing 757-300 engine hold-open devices in use. Property of United Airlines.

At the core of United's LOSA success is the continual support of the program from management, union, and front-line colleagues. The strength of the program comes from the process of selecting the right individuals to represent the program. LOSA observers are individuals who are identified as being well respected and trusted among their peers, union representatives and management. These observers have inspired and led important changes, process improvements and innovative solutions to issues identified through observations. Examples include a practical approach to constructing a 737 tire change tool kit and the manufacturing of a new device to ensure the forward hold-open rod connects properly during a 757-300 nose cowl replacement.

These significant contributions are evidence that there was a reservoir of knowledge that was just waiting to be tapped.



Detail of Boeing 757-300 hold-open device. Property of United Airlines.

The key to United's LOSA success and efficacy lies in the hearts of the people dedicated to its purpose. These safety professionals are the believers and achievers who contribute to the day-to-day performance, promotion, and support of the program. But it is important to also recognize the dreamers who continuously think of ways to inspire and invigorate the LOSA program to be even better than what it is today.

When it comes to LOSA, are you a believer, achiever, dreamer … or some of all three?

Human Factors Observations from a Korean Aviation Safety Seminar

Dr. Bill Johnson

Summary

Bill Johnson reports on his observations from the 3rd Asian Aviation Education and Training Symposium in Seoul, Republic of Korea. While the maintenance human factors challenges are similar to the US and rest of the world, South Korea has its unique challenges and solutions that work well. While the maintenance training is like the US, there is also a reliance on a European-like apprentice period.

Seminar Overview

I recently had the pleasure and honor to work with the Korean Ministry of Land, Infrastructure and Transport, specifically the Office of Civil Aviation, with Halldale Publishing, and with the Korea Airports Corporation. Together, we planned, organized and conducted a 2+ day meeting, for 300 delegates, focused on safety education and training. A representative sample of the planners and airline executives is in Figure 1.

Figure 1: Planners and VIP Delegates

There is a long-term predicted 7% annual growth in aviation-related jobs in Korea. The government has a goal to increase all aspects of aviation training from flight deck, to engineering/maintenance, to aviation management personnel. Korea is determined to prepare aviation professionals, especially from Korea, to serve the growing number of aviation organizations in the country. They are also planning to offer their training services to other countries, particularly the rapidly expanding Chinese aviation industry. Of course, the majority of the conference delegates were from Korean companies such as: Korean Air, Asiana, Jin Air (a Korean Regional Carrier), Juju Air, Air Seoul, and about 5 other local airlines. China and other Asian countries were also represented. In addition to Korean aviation professionals were speakers and delegates from companies like Lufthansa Technical Training, Leonardo Helicopters, and other western companies.

The meeting was for personnel from training organizations and from senior management. Students from aviation training programs and colleges were also invited to attend. This short article describes the meeting format and a few selected maintenance-oriented topics that were presented and discussed.

Conference Format

The content was equally divided between flight and maintenance-engineering training. In Asia, like most other countries, the term "engineering" is used where the US uses the term "maintenance". For this Newsletter I used both words. Each topical area had two sessions, one for only presentations and another for workshops with demonstrations, case studies, and Q&A/discussion. The workshop/demo sessions had smaller attendance that the lectures, thus making it ideal for discussions and demonstrations.

Worker Shortage and Aviation Maintenance Training

There are worker shortages throughout the region but the Korean aviation industry has been able to fill current demands with qualified Korean workers. Increasing aviation-related training is a significant part of the long-term worker qualification planning. Aviation careers, especially flight operations and maintenance/engineering must compete with Korea's high tech and manufacturing industries. Unemployment is relatively low, just over 3%. Fortunately, aviation positions are respected in the Korean society.

The aviation schools follow a combination of FAR Part 147 formats and also adhere to many of the content requirements, like Human Factors initial and recurrent, from the EASA regulations. Like the US, the mechanic can obtain the A&P license with slightly over 2,000 hours of prescribed training. A second means of certification is to enroll in an apprentice program with an aviation company.

The airlines provide most of the aircraft-specific type-training but aircraft type training is not a requirement for all certified maintenance staff.

Human Factors

Traditional Human Factors (call it HF I) centers on fundamental human psychology, physiology, error, sleep science, and more. Human Factors II evolved to aspects of safety culture like safety management, fatigue risk management, voluntary reporting, just culture, and more. Szepan and Johnson (in press, 2019) speculate that HF III will address technology-based human-centered job support to include technical and individual-worker fitness for duty information and advice. HF III was not a meeting topic nor further discussed herein, but will be covered in 2020 Newsletters.

Maintenance-Engineering human factors had four sessions (2 lectures & 2 workshops) and was mentioned in additional sessions. Audience interest in the HF topic was high, based on the extensive number of questions, comments, and discussions. In two workshops the discussions went past the scheduled time and had to be terminated. Three of the high interest topics (discussed below) were worker fitness for duty, procedural compliance, voluntary

reporting, and Safety Management and voluntary reporting.

Worker Fatigue in Korea

Korea is a highly industrialized country where, culturally, sleep is undervalued and long sleepers have been regarded as idle people. The Organization for Economic Co-operation and Development (OECD), with over 100 developed member countries, ranks Koreans as one of the shortest sleeping countries. The Aviation industry recognizes that threat and is addressing it. For pilots, the government has their modified version of FAR 117 for flight and cabin crews.

There are duty times for maintenance crews. They must have 8 hours of rest prior to maintenance duty and cannot be scheduled for more than 12 hours. When they work overtime, it cannot exceed 16 hours straight or 20 hours in a single day and they must be given at least 10 hours off after days of overtime. There is not currently a requirement of a Fatigue Risk Management System like the one in Part 117. This is an opportunity for improvement.

According to delegates at the meeting, sleep and fitness for duty is discussed in the human factors classes.

Procedural Compliance

I presented on the topic of following procedures. The lecture and workshop audience acknowledged that failure to follow procedures (FFP) is always a challenge. Korean workers have a positive national and working culture about following procedures. That helps the FFP situation. There was high interest in the FAA's new web-based Follow Procedures training and associated job cards (See Followprocedures.com).

Safety Management Systems and Voluntary Reporting Systems

One of the maintenance/engineering workshops had an extended discussion about SMS and voluntary reporting. The discussion participants were primarily engineering safety managers. They said that voluntary reporting is more challenging in the Asian culture than in the US. They were committed to adopting successful practices from the US. The managers were trying to find ways to convince workers that there is a high safety and financial payoff in reporting errors. As a result of this discussion, about 3 Korean companies are attending the Fall FAA-Industry Aviation Safety Action Program InfoShare Meeting. They expect to learn about and adopt best practices for voluntary reporting.

Conclusions

International aviation safety meetings are the ideal way to learn from one another and share best practices. Such meetings facilitate lasting high-value technical and professional relationships. There is extreme value in a handshake, card exchange, and discussion over a coffee or tea. The learning is always a mutual exchange of ideas and values. Meetings that are specifically dedicated to topics like training, non-destructive inspection, flight simulation, human factors, and others attract delegates that share the same challenges and offer a variety of solutions. These meetings reinforce that, while delegates are separated by miles, time zones, and oceans, we all share the objectives associated with safe, cost-effective, efficient, and comfortable transportation.

Other HF Resources and Links

Click the icon for more information

Follow Procedures: The Buck Stops with Me

Aviation Maintenance

FAA Training Tools and Resources

ICAO Journal

Aviation Human Factors Industry News by System-Safety.com

Decoding Human Factors Newsletter

Nuts and Bolts Newsletter

FAA and Industry General Aviation Awards

Aircraft Maintenance Technology

FAA Mechanic Award Programs