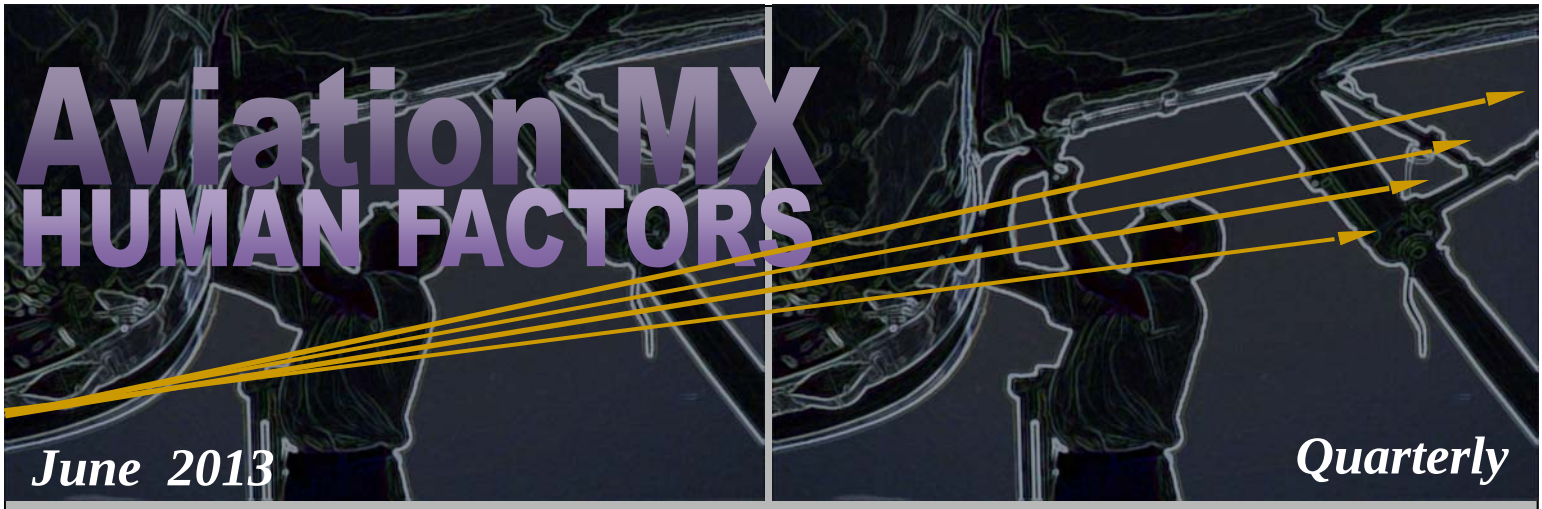
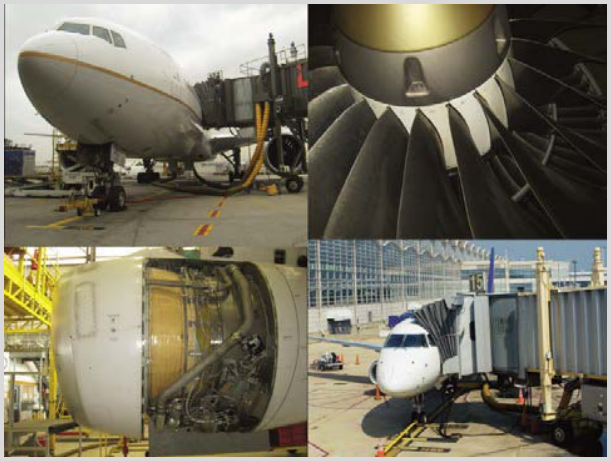


Vol 1 I Issue 2

FEATURED ARTICLES

Written by maintenance human factors professionals dedicated to identifying and optimizing the factors that affect human performance in maintenance and inspection.
Past newsletters @ MXFatigue.com

Maintenance Line Operations Safety Assessment (M-LOSA) is Gaining Popularity around the World



BY

Dr. Maggie Ma & Dr. Willaim (Bill) Rankin

*About the authors: **Dr. Maggie Ma** is a Certified Human Factors Professional (CHFP) who specializes in maintenance human factors at the Boeing Company. Maggie has over 10 years of experience in conducting applied human factors research to improve aviation safety through developing various safety programs. She has worked closely with airlines, manufacturers, maintenance organizations, ground service providers, and regulatory agencies in both the US and China. **Dr. William (Bill) Rankin** is a Boeing Technical Fellow and Lead of the Maintenance Human Factors Group in Boeing Commercial Aviation Services. His responsibilities include the development of maintenance and ramp Human Factors processes and training relevant to Boeing customer airlines. He currently serves on the Flight Safety Foundation's Maintenance Advisory Committee. In February 2013 Bill Rankin and Maggie Ma received the Engineering Team of the Year Award for Commercial Aviation Services.*

Around 2007, based on the pilot Line Operations Safety Audit (LOSA) concept, a couple of US airlines started implementing LOSA into maintenance and in ramp operations. Because of interest in the concept, the Airlines for America (A4A) started a task force whose job was to more fully develop the Maintenance LOSA (M-LOSA) and the Ramp LOSA (R-LOSA) processes. Task force members included staff from several airlines, ground services providers, the Federal Aviation Administration (FAA), and Boeing. The FAA funded a Research and Development project in 2008 to help support the effort. The task force worked over a 3.5-year span to develop the observation forms, threat codes, error codes, a database, implementation guides and training materials needed to support M-LOSA and R-LOSA implementation. To best promote voluntary participation and non-punitive safety culture, the task force redefined LOSA as "Line Operations Safety *Assessment*." Based on the Threat and Error Management framework, M-LOSA is a tool for collecting safety data during normal, routine aviation maintenance operations through peer observation in strict non-jeopardy conditions. It is a way for a company to perform a self-assessment. Through observations of both "at risk" and "safe" behaviors, LOSA can identify and consequently mitigate "at risk" behaviors and reinforce positive behaviors.

The Boeing Maintenance Human Factors team within Commercial Aviation Services is committed to provide implementation support to its customer airlines and other maintenance organizations on M-LOSA and other safety processes/programs. The team has observed an increasing interest in M-LOSA over the past 10 months. Requests for M-LOSA observer training come from both airlines and Maintenance, Repair, and Overhaul (MRO) organizations. A large percentage of requests are US domestic; however, M-LOSA is definitely gaining interest in Europe and Asia.

Recognizing many potential benefits that M-LOSA offers, maintenance organizations around the world are particularly interested in customizing M-LOSA to meet their specific operational needs. For example, one organization is adopting M-LOSA as a mentoring technique to extend its in-classroom and on-the-job training. Another organization intends to tie M-LOSA closely with its Maintenance Human Factors Program by establishing observable key performance measures (behavior markers). Organizations are often delighted to discover that M-LOSA is able to identify issues that are not revealed by other safety programs, such as event investigations and employee self reporting. From that perspective, M-LOSA is complementing some existing programs.

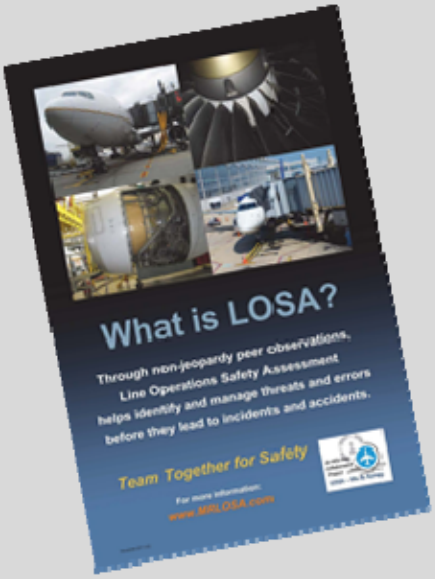
Maintenance Line Operations Safety Assessment (M-LOSA) is Gaining Popularity around the World (con't).

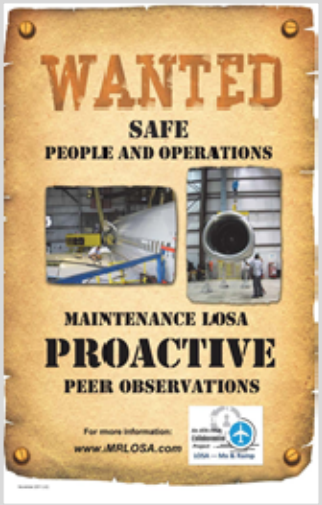
Through working with several organizations in preparation for implementing M-LOSA, we recognize the following as key challenges for M-LOSA success:

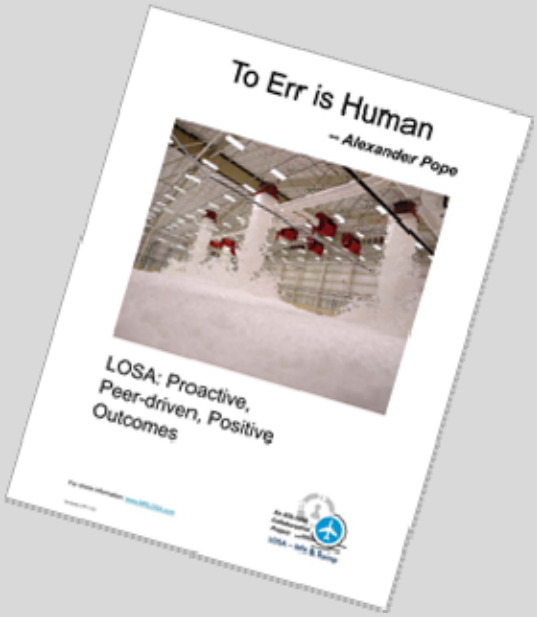
Continual Support: The organizations need continuous and consistent support, which includes initial training, a platform to share best practices and lessons learned among M-LOSA users, and a website to access most recent tools. The suite of M-LOSA tools (e.g., observation forms, training, and implementation guide) needs to be updated based on user feedback on a regular basis.

Data Integration: Begin with the end in mind. Better guidance is needed on how to integrate M-LOSA data with other sources of safety and operations data. Several organizations have expressed a desire for future data sharing, so that they can benchmark their performance against industry performance. M-LOSA is a predictive hazard identification system for an organization's SMS. Along with other safety efforts, it helps reduce costs, improve safety and efficiency. Organizations are facing the challenge of rapid accumulating data from various safety programs within the SMS umbrella. How data from different programs can be integrated and analyzed in a meaningful way requires strategic thinking and good IT infrastructure planning at organization level and industry level.

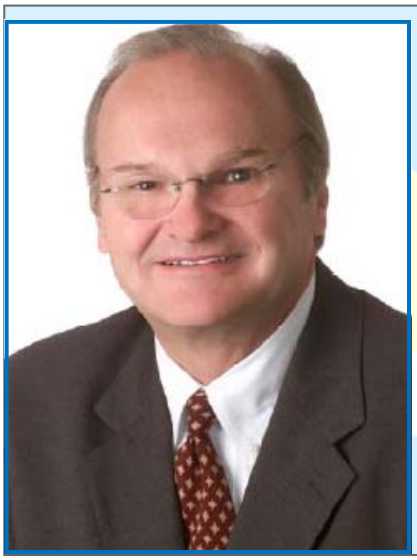
Safety Culture: Some organizations recognize it is challenging to implement safety programs when their national and/or organizational safety culture is somewhat punitive. These organizations need help regarding how to change their punitive culture in small specific, practical steps. Examples of successes and lessons learned on how to instill a good safety culture, as well as how to deal with negative norms in the workplace, are useful to these organizations in moving toward a safety culture.







For more information about LOSA, go to https://hfskyway.faa.gov/HFSkyway/MLosaHome.aspx



Do You Qualify to Work as a Human Factors Trainer?

BY
Dr. Bill Johnson

About the Author: *Bill Johnson is the Chief Scientific Technical Advisor for Human Factors in Maintenance Systems for the FAA. He is a pilot and an aviation maintenance technician.*

Earlier this year the European Aviation Safety Agency (EASA) issued a notice for proposed amendment to the Safety Management System Regulations. Part C of the comprehensive proposal addresses maintenance organizations, especially MROs. In Europe, even the airlines must have an MRO Certificate to conduct maintenance on their aircraft.

The proposed amendment was long on human factors recommendations that also included maintenance fatigue risk management. This article focuses on Section 145.A.30(e) – Qualifications of Human Factors Training Personnel. Are you qualified for your job? It says that a "competent human factors trainer should meet the following Criteria:

1. attended training that is equivalent to the EASA Part 145 HF syllabus…..MG1 145A.30 (e),
2. received instruction in training techniques,
3. worked a minimum of three years within aviation industry, or possess a suitable academic background, and
4. has an appropriate level of human factors (knowledge)…in relation to the organization's HF program

The organization must develop and document how each HF trainer is deemed to be qualified, capable, and fully competent as not only a human factors expert but also as a trainer. The proposed rule has an evaluation matrix on pages 62-65, in Part C .

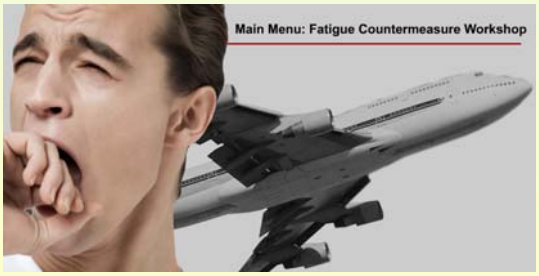
This author believes that the EASA proposal is thorough and realistic. If I am taking an engine course, I want an instructor that has knowledge and experience with engines and also knows how to teach. The same should be true for your human factors trainers.

All these credentials are reasonable and most current HF trainers in the US and around the world would qualify. This proposed rule merely raises the bar for the marginal companies who assign the HF trainer role to the person with the least to do.

This rule is not complete, it does leave something out!

The best HF trainers have passion for the topic. They demonstrate and communicate the interesting and important operational facts about human factors. They can tell a great story. They promote discussion that is unimaginable. They ""Get it."

This can't be captured in a rule but bravo to EASA for establishing the criteria for trainers.



Fatigue Countermeasures Training available at MXFatigue.com—https://hfskyway.faa.gov/HFSkyway/FatigueCBT.aspx

Up With This I Will Not Put!

By
Dr. Colin Drury

About the author: Dr. Colin G. Drury is President of Applied Ergonomics Group Inc and Distinguished Professor Emeritus at University at Buffalo: SUNY. As Director of Research Institute for Safety and Security in Transportation (RISST), his work is concentrated on the application of human factors techniques to inspection and maintenance processes. Since 1989 he has been leading a team applying human factors techniques to reduce errors in aviation maintenance and inspection at RISST.

These are the jokey words of Winston Churchill trying to make a point about how silly it is to follow grammar rules without thinking. But they also have a few lessons for documentation design, both in the design of documents themselves and in the sentiment of not putting up with anything but the best. We place a high value on following procedures in every aspect of aviation maintenance. This is both an organizational value and a value of personal pride. But "Procedure not followed" re-occurs with depressing regularity in incident and accident reports in aviation. Failure to follow instructions was the primary cause of maintenance errors reported through Boeing's Maintenance Error Decision Aid (MEDA). To help us solve this problem, let's review why we still have problems despite good intentions.

The Good News!

First the good news: Most AMTs and inspectors DO follow instructions most of the time. It is just that in such a safety-critical job, we need to find ways to replace "most" with "all". More good news: There has been much research on how to design better instructions, complete with evidence that well-designed documents reduce error rates. One study by my group at SUNY Buffalo showed that ALL the errors made by inspectors on a task card at a major airline occurred where good human factors guidelines were not followed.

The research shows that a good document must have the right *content*, the right *readability* and the right *organization*. Most of the research has been brought together in a simple Documentation Design Aid, available at www.hfskyway.com .

Content means that the procedure needs to be both accurate and usable. Following the written steps should lead unambiguously to the correct result for the job, but also the steps need to make sense to a skilled and experienced AMT or inspector. If there is a way that looks "obviously" better to the user, then the procedure will encourage short cuts or "local folklore". These will typically involve how *not* to follow the written procedure: a recipe for future errors. ***Readability*** means that the procedure needs to use unambiguous grammar and terms, for example following the rules of Simplified Technical English (STE) which has been proven to reduce comprehension errors. It also means that good diagrams are needed, shown from the viewpoint of the user, not the engineer who wrote the procedure! We used to find lots of examples showing the structure of the right wing with a note saying "Left wing similar", which again transposition encourages errors. I hope all of these lazy shortcuts have disappeared by now! ***Organization*** means that the procedure must fit in with how an intelligent person (e.g. you) would perform the task. I have seen lots of examples of checklists where the AMT was supposed to check, for example, the placards on every seat, then check the life vests on every seat. Every EMT I met used to perform all the checks at each seat then move on to the next seat, saving much leg work and bending down. In technical HF terms, the checklist should be organized spatially. If not, then the procedure as written is unlikely to be followed, leading straight to "Procedure not followed" errors.

So where does that leave Mr. Churchill, and us?

First, it means that rules should make sense to the user. If a convoluted procedure comes from blindly following the rules (see title of this piece), then look again at the rules. Second, it means that you as the ultimate user of a document need to be less tolerant of poor design: don't put up with things as

Up With This I Will Not Put (con't).

they are if they look error-prone to you. If the organization, or the content, or the readability of a procedure tempt you to develop a work-around, then that is a good sign that the procedure is error-prone. Even if YOU follow the procedure exactly, you know that somebody, somewhere on a cold wet night might not be so fastidious.

We know WHAT needs doing, but that does not mean change will happen. Human Factors people, even with years of aviation experience, can be bypassed by invoking pressure of work. But YOU are the person who sees every issue at first hand. If just one person wants change, management / engineering can easily dismiss it as "Old Joe grumbling again". But if *nobody* will put up with it, then action is inevitable. In the short term, making the needed changes represents more work for overworked engineers. But in the long term, removing potential errors from the aviation maintenance system will benefit you, the company and the traveling public. Data (and experience) are on YOUR side.

About the Maintenance Human Factors Newsletter:

The Maintenance Human Factors Newsletter began several years ago as the "MX Fatigue Focus Newsletter". The newsletter included information on fatigue and fatigue risk management. It was written for aviation maintenance technicians and their managers in Plain English. The newsletter covered stories on scientific studies, federal regulations, and industry successes. In many case the short articles were written by technicians, managers, students, and professors, among others. It was not necessarily a scientific publication.

This newsletter is intended to be an extension of that early work with an expanded focus to human factors issues across aviation maintenance.

If you have a story to tell that will help enhance aviation safety, please email katrina.avers@faa.gov or bill-dr.johnson@faa.gov. The editorial staff will help writers with layout and graphics.

If you would like to be added to our quarterly distribution list, please email joy.banks@faa.gov