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# Keeping it Real with Maintenance Human Factors at FAA

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The MRO and airline maintenance industry has focused renewed attention on maintenance human factors over the past two years. Some of the new emphasis is driven by requirements to comply with European Aviation Safety Agency (EASA) rules for repair stations and also to the new FAA Part 145 rule. Many maintenance organizations have created a job position for maintenance human factors manager, reporting to the vice president for engineering or quality. In most cases, the new HF managers are chosen for their communication skills, human factors experience and credibility with maintenance personnel.

My two-year tenure at FAA is long enough to have an insider's view, but not so long to forget a long career on the outside of the FAA. Industry and FAA colleagues remind me to capitalize on both views as we create guidance materials and continue researching maintenance human factors. The best advice that I can follow is to "keep it real." That means to pay attention to the real users of FAA policy and products.

The real users are airline and MRO maintenance and engineering personnel, the training and quality departments, and the FAA Aviation Safety Inspectors. Attention to human factors should include everyone in the organization at all levels. The primary results of the information are continuing high safety and increased efficiency in maintenance operations.

Over the past couple of years, there has been a lot of progress on human factors. It is a result of past momentum and on the new determination of FAA senior management to increase attention and ensure resources to maintenance human factors. The signs of progress are numerous.



Operator's Manual

The Operator's Manual for Human Factors in Aviation Maintenance ([www.hf.faa.gov/opsmanual](http://www.hf.faa.gov/opsmanual)) was completed in late 2005. A team of industry, government and academic human factors practitioners combined wisdom and experience to identify five critical maintenance topics for human factors attention. For each area, the manual briefly explains why each topic is critical, how to address the topic, how to measure success, and key sources for additional information.

Keeping it Real with Maintenance H...

It is written in straight-forward language and appears to be more of a "how to" checklist than a treatment of the human factors topic. Industry is quite receptive to this new breed of web-based FAA guidance material. It already is published in English, Spanish and Chinese. The manual received the FAA "Plain Language Award" from FAA Administrator Marion Blakey for clarity in communication of technical information.

The chapters of the manual cover event investigation, documentation, training, shift turnover and fatigue/ alertness. Event reporting is the most important step to ensure that an organization understands areas to reduce the risk of human error. Numerous studies have shown that failure to follow the documented procedure is the most common human error in maintenance. The Operator's Manual identifies steps to minimize such error. The manual also offers guidance for training developers that is aligned with the guidance offered by EASA. Shift/task turnover events are frequent. The manual offers methods to ensure effective methods of passing information between personnel within and between shifts. Fatigue/alertness issues have been at the forefront of human factors attention for all types of aviation jobs in our 24/7 industry.

A final chapter of the manual addresses the issue of Program Sustain- ment and Cost Justification. It demonstrates a straight-forward method of conducting cost justification on human factors interventions.

The Operator's Manual for Human Factors in Aviation Maintenance has been downloaded from the FAA site about 2,500 times, which is a great indication that the international industry has a large appetite for human factors information written in plain language.

Also, in 2005, FAA released the first of many Advisory Circulars that will impact maintenance human factors. The document, Advisory Circular 145-10, Repair Station Training Program, addresses designing training programs for repair stations. With increased airline industry reliance on contract or outsourced maintenance, FAA wants to work with industry to maintain continuing high safety and quality standards. In that document, FAA "concur with European authorities in that human factors training related to maintenance practices would provide an additional margin of safety to the repair industry."

At the same time, FAA is increasing human factors training for all safety inspectors from two days to three. This will help ensure that FAA personnel not only can understand but also add value to industry training programs. Similar new human factors training requirements are in development for airlines, large and small.

In another sign of progress, FAA, in cooperation with a European/ Scandinavian Joint Aviation Authority Maintenance Human Factors working group, distributed an international survey on human factors in maintenance in July. It was a web-based survey sent to nearly 700 volunteer participants from more than 300 organizations in 70 countries. Results will be ready in the fall. The survey is expected to provide an excellent picture of maintenance human factors worldwide. All results will be available on the FAA website.

#### Enhanced Staffing

The renewed determination of FAA management is demonstrated by an increase and change in staffing. FAA created the position of chief scientist and technical advisor for human factors in Aircraft Maintenance Systems, an executive position that reports to Nick Sabitini, FAA's associate administrator for safety. That position ensures full-time executive attention to maintenance human factors. At nearly the same time, the Flight Standards Service hired Jay Hiles, a 25-year airline maintenance veteran and labor leader, to manage the maintenance human factors activities from Washington. The position ensures that FAA is addressing real-world challenges and communicating with words, actions and products that make sense to industry.

Management commitment also is evidenced by ensuring the resources for research and development. Examples include a significant study of language-related errors when non-native English language speakers use English language technical documents. The study showed that international repair stations have programs in place that minimize error to the extent that it is no different than native English speakers using the same documents. The study also offered guidelines to minimize the risk in such operations. This is a significant finding related to international MROs.

#### Future Challenges

"Keeping it real" also means that some studies must look to the sometimes surreal future opportunities and challenges. One such study addressed issues of certification for maintenance personnel on unmanned aerial systems. Today's Airframe and Powerplant mechanics may have to develop a new knowledge and skill set to certify the airworthiness of unmanned systems. Or, today's unmanned aerial system engineers may want to start working on their A&P. Similar opportunities exist with respect to commercial space travel and the alternative engines such travel likely will utilize. There also likely will be qualification challenges as repair stations emerge to service the many very light jets that will become part of the aviation maintenance landscape in the near future.

Guidance, policy, and research will continue to address high impact issues like fatigue, technical documentation, and similar day-to-day challenges in the MRO industry.

The term human factors no longer is a mystery or a difficult concept for aviation maintenance personnel. Human factors support is no longer the privy of Ph.D.s and other consultants. The airline and MRO industry has stepped up to better understand their human factors challenges and opportunities for improvement. Government and human factors service providers must prepare documents, procedures and products that are easy to understand and to use. In other words, "keep it real." Dr. Bill Johnson joined the FAA in 2004 as the chief scientific and technical advisor for Human Factors in Aircraft Maintenance Systems. He is an Aviation Maintenance Technician, a pilot for nearly 40 years, and a Ph.D. from the University of Illinois.

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