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Aviation Maintenance Mishaps – The Human Element

One of the leading causes of aviation maintenance-related mishaps is human error. Human factors that lead to maintenance mistakes significantly impact safety and operations. Understanding the human aspect of our maintenance technicians regarding complacency, "*wrong*" norms, stress, pressure, and fatigue are powerful forces affecting our fleet. One of our most important assets is people getting the job done every day. We owe it to them to be aware of the human factors behind mishaps and to identify them before they become an issue.

Comfort Can Lead to Complacency. Aviation maintenance involves many routine tasks, such as hourly and calendar year inspections requiring the use of maintenance requirement cards (MRCs). Everyday tasks help build proficiency and reduce the chance of errors over time. However, there is a built-in risk behind proficiency, which can lead to complacency if not checked. The expectation should be that you use the same level of attention to detail every time as if it was your first, but with a higher level of understanding. If the task requires a checklist, use it without deviation. Overconfidence significantly contributes to complacency, so don't let it prevent you from noticing the warning signs of a mishap in the works.

When Doing it Wrong Becomes the Norm. Wrong norms can be defined as shortcuts to procedures or workarounds that develop into the norm over time. These norms are typically intended to reduce the time spent on a task or as a temporary procedure without the proper tools. Workarounds are short-term fixes to long-term problems, as in the case of a recent malfunctioning hangar door:

- A command was having problems with the operation of a hangar door that required them to bypass an electrical terminal to open and close the door. Initially, they took the proper steps to get the door fixed, but because of labor and part constraints, it took longer than usual to receive the parts. For several years, the squadron normalized bypassing the terminal to get the door to operate. It became Standard Operating Procedure (SOP). — *If your unit has a similar issue, elevate the situation up the chain of command and do not assume the risk at your level. Sometimes we have to do more than say, "My hangar door is broken." This unit was fortunate not to have a severe electrical shock mishap.*

Stress – The Silent Causal Factor. Stress can come from many influences and may set bodily responses in motion, leading to temporary or permanent harm. Symptoms of stress can range from loss of appetite and low energy to headaches, chest pain, insomnia, depression, and anger. The complete list is long and so is the list of causes. Life worries, no control over the work environment, personnel conflicts, and even diet and sleep are a few of the more common stressors. — *Early detection of stress and implementing controls will help move your team toward a safer (and happier) workplace*.

Under Pressure. Real or self-imposed pressure can lead to maintenance errors. Here are some examples: Foreign Object Damage (FOD) left in the aircraft, incorrect installation of components, inadequate lubrication levels, access panels, fairings, or cowlings not secured correctly, to name a few. Here is a scenario to help drive home our point:

- A maintainer was replacing an aircraft's fuel dump actuator in the ship's hangar bay. When the technician was notified that the plane was being moved to the flight deck, he completed the installation of the fuel dump actuator and temporarily installed the panel, not using the required minimum number of fasteners, according to the maintenance publication. He also did not update the Maintenance Action

Form (MAF) to reflect the status. The priority to get the aircraft moved to the flight deck clouded the maintainer's judgment and the plane captain, who assisted with the aircraft move without performing a panel security check first. Once exposed to the high winds on the flight deck, the panel departed the aircraft and blew overboard into the sea, costing over $100K in repairs. — *Foster an environment where anyone can speak up, even under pressure to get the job done quickly.*

I'm Tired. Fatigue can affect maintenance tasks through impaired judgment, difficulty focusing attention, memory lapses, reduced motivation, and other performance effects. It may also be a symptom of stress or working under pressure to get the job done quickly. Maintenance technicians often work extended hours throughout the night, which leads to a lack of sleep. Successive long shifts can increase fatigue and lead to errors, which may be as small as a failure to torque a bolt, but could compound over time and lead to serious mistakes. Training is the best way to raise awareness of fatigue-related errors and strategies to get sufficient sleep. Here is an example:

- After four attempts to replace an F/A-18 canopy, two aircraft maintainers, one of whom had not slept in more than 20 hours, removed the canopy screws in the wrong order. The port aft screw became stuck and required extraction. Using improper tools, the maintainers drilled into the windscreen. In addition to fatigue, the maintainers felt pressured to finish the job after four previous attempts.

— *Supervisors, monitor your team and ensure the appropriate number of breaks if possible. Consider options to maximize sleep opportunity.*

Key Takeaways

Identifying human factors that distract our maintenance professionals is vital to reducing maintenance-related mishaps. Here are some areas to help focus your team.

1. **Complacency can be dangerous.** The confidence that comes with routine tasks can be detrimental if not addressed often. Continue to stress the importance of using the publications all the time. Emphasize that no matter how often they have done it, use the tech pub.

2. **Resist the *wrong* norm.** How often have you heard, "this is how we've always done it"? Challenge the bad norm and resist the urge to work outside proper maintenance procedures. Ask yourself how much time did we really save and know the consequences of the example you are following. Is the juice worth the squeeze? We think not. Think safety first.

3. **Manage stress.** Identify the stressors surrounding maintenance mistakes. Engage with your technicians to ensure proper stress relief and keep a pulse on the climate. Consult professionals if the stress becomes unmanageable. Speak up if you feel overwhelmed. Everyone processes stress differently, so knowing your team and recognizing signs of stress is essential to a culture of safety.

4. **Pressure and fatigue reduce production.** Remember to document work production regardless of outside pressure forcing you to expedite the task. Staying focused on one job at a time will help reduce mistakes. Fatigue can affect sound judgment. Get the proper rest before working on maintenance equipment. Consult others and build a team free from pressure and fatigue.

For more resources on human factors, visit the links below.
https://intelshare.intelink.gov/sites/nsc/ (in the aviation section under the topics tab)
https://www.faasafety.gov/files/gslac/courses/content/258/1097/AMT_Handbook_Addendum_Human_Factors.pdf
https://www.faasafety.gov/gslac/onlineresources.aspx?categoryId=90&masterId=2&n=amt

And remember, "let's be careful out there"