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Aviation Maintenance Injuries

The successful completion of thousands of daily aircraft maintenance tasks is a testament to professionals getting the job done and the operational resilience they bring to the naval enterprise. However, the persistent flow of mishaps into the Risk Management Information database shows there's still room for improvement. Letting your guard down is not an option for our operational environment. Taking shortcuts, not wearing appropriate personal protective equipment (PPE), or daydreaming rather than remaining situationally aware, are all examples of letting your guard down. The following incidents discuss where the team's guard came down.

File photo, not associated with a mishap

Like a Punch in the Eye From Yourself

A maintainer was removing a large fairing from an aircraft as part of a recurring inspection. He was on a B4 maintenance stand wearing the required PPE (cranial) for the task. The prescribed tool (socket and ratchet-drive) wasn't available as the only set was at the squadron's forward-deployed location. Due to this known deficiency, technicians commonly improvised with alternative tools to get the job done. The maintainer chose to use a socket wrench on the bolt with two open wrenches attached to the end of the socket wrench to increase torque (leverage) to loosen the bolt. The non-standard combination of tools broke loose under high torque and the socket wrench slipped from the bolt, resulting in an open wrench striking the maintainer in the eye. He was taken to the ER, given a few days SIQ to heal and luckily, returned to work with no long-term effects. *—The report points out that an available breaker bar was the next safest alternative to generate the torque needed. Instead, the maintainer took a shortcut to save time and used a non-standard combination of three wrenches. Had he identified the additional risk when deviating from the procedure, proper risk mitigation should have led him to wear additional PPE, such as goggles and gloves, which were not required when following prescribed procedures. The repetitive deviation from the prescribed procedure for this task was caused by a known tool shortage but the next best option—using a breaker bar—was not standardized by leadership. If a procedural deviation is necessary, the situation should be elevated and communicated to the right level of leadership (risk owner) so they can make an informed decision on how to proceed and communicate the solution appropriately, rather than each worker deciding on their own.*

Pinch Point Warning Becomes Clear

A maintainer and collateral duty inspector (CDI) were assigned to service the aircraft nose landing gear (NLG) strut. Maintenance leadership had stressed to take it slow, safe and ask questions if needed. The task requires hydraulic pressure to be released from the strut using the Schrader valve on the rear of the NLG assembly. After the first few initial steps were completed, the CDI, uncertain of the next steps, moved out to the side of the aircraft to continue reading the maintenance aid (*but allowed the maintainer to continue*). The maintainer put one hand on the outside of the NLG strut, while using his other hand to operate the Schrader valve, abruptly releasing the pressure. The strut quickly compressed and pinched the maintainer's resting hand, trapping it completely. Several Sailors nearby noticed the emergent situation and responded by lifting the aircraft enough to release the pinch point freeing the maintainer's hand, then notifying emergency response. The maintainer was treated at the ER for injuries resulting in permanent partial disability. *—Procedural warnings in the manual state not to open the valve too quickly, and to keep arms and hands clear of the assembly as the NLG may compress rapidly, resulting in injury or death. Yet, neither the maintainer nor the CDI seemed to fully grasp the pinch-point hazard or heed the warnings. The warnings should've been discussed from the start, during a risk management (RM) brief. The CDI tried to read through the procedure but allowed the maintainer to press ahead. Instead, the CDI should've spoken up, stopped the process and had a time-critical RM discussion to resolve the uncertainty. If you're unsure of how to perform a procedure, get clarity (ask a supervisor) rather than pressing forward. Understand and respect the risks of a given task and know when to ask for help.*

Do NOT Put Your Finger in There!

A maintainer was part of a small maintenance crew installing a ramp assembly onto an aircraft. The crew's lead looked over the finished job and found the ramp mounting bolts installed in the wrong mounts backwards, and directed the crew to re-do the work. The maintainer crawled underneath the ramp and positioned himself under the starboard hinge point to remove the bolt and bushing. Other crew members were at the ramp edges using a shaking technique to momentarily reduce the friction enough to help remove the bolt. The maintainer got the bolt out but the bushing remained in the mount. He pulled on the protruding bushing, but the shaking technique oscillations caused it to go further into the hole. He asked the crew to stop shaking the ramp, but it continued. The maintainer inserted his finger into the hinge point mounting to extract the bushing anyway. Simultaneously,

the shaking motion caused the ramp and aircraft hinge points to separate (*no bolt holding them in place now*), allowing the ramp to shift, crushing and trapping his finger. It took the crew and others nearby to stabilize the ramp while the crew lead pressed down on the opposite side to align the mounts and release the maintainer's finger. He was quickly transported to the hospital and ultimately retained his fingertip thanks to prompt medical attention. *—The ramp hinge is an unforgiving mechanical pinch point, a danger documented in procedures and commonly understood by most, but not all, maintainers who work on aircraft with ramps. A deliberate risk assessment wasn't done because the bolt installation wasn't considered a high-risk activity. Supervisors must emphasize procedural compliance, cautions and warnings, and SUPERVISE, especially junior (less experienced) personnel. A pre-job risk brief covering the process and its hazards likely would have prevented this mishap.*

Situational UN-Awareness

Two maintainers (M1 & M2) were repairing a panel fastener on top of the port wing of the aircraft on the flight line. During this time, other maintainers arrived at the aircraft and started fueling it on the starboard side. While fueling, two fueling crew members noticed the ladder (integral to the aircraft) was extended down and, not having seen anyone climb onto the aircraft, stowed the ladder. A short time later, M1 went to climb down off the wing to get parts for his task. He grabbed the safety handle and reached his leg over the port wing leading edge extension, shifting his weight, fully expecting to step down onto the ladder. With the ladder stowed, he was unable to stop his descent and fell backwards off the aircraft, landing on his side. Upon seeing M1 fall, the fueling crew stopped fueling, assisted M1 to maintenance control and lowered the ladder for M2 still on the aircraft. M1 was transported to the ER and treated for multiple fractures (*and pain*), leaving the maintenance department down a skilled maintainer for almost two months. *—The fueling crew was unaware the two maintainers were working above them on the aircraft while they were fueling (task saturation). It took two maintainers from the fueling team to stow the extended ladder, yet neither followed the procedure to verify no one was on top before stowing the ladder (lack of procedural compliance). A lapse in situational awareness by both maintainers on top of the aircraft and the fueling crew illustrates why it's always important to, 'keep your head on a swivel', emphasizing the need for constant vigilance and maintaining a 360-degree perspective on the flight line. Thankfully, M1 wisely wore the required PPE correctly - cranial on with chin strap fastened, which likely saved him from an even more serious injury.*

Screwdriver Becomes a Hole Punch

A maintenance technician was tasked to remove the de-ice harnesses from an aircraft so they could undergo internal wiring work. He successfully removed two of the four harnesses without issue. When working on the remaining two harnesses, he had trouble keeping the Phillips screwdriver seated in the screw, it kept slipping out. A couple of more-experienced maintainers nearby offered advice on other techniques to better maintain proper seating. He ignored the advice and continued his original technique for the next few minutes, forcing the screwdriver by increasing the pressure on each try. The screwdriver abruptly slipped again, but this time it hit and punctured his hand. He received two days SIQ to allow the puncture wound to start healing and then some limited duty time. *— The technician failed to use time-critical risk management during the task even after his method was recognized as unsuccessful and suggestions were made by others with more experience. He should've paused and reevaluated, instead, he chose to press on with the mentality that his method worked on the first two harnesses, even though the screws weren't coming out as easily as the others. He used an 8-inch screwdriver (longer than recommended for the job), where a shorter screwdriver would have improved control. Putting on gloves (even though the task didn't specifically call for them) would've provided additional protection if the screwdriver slipped again. Don't let overconfidence lead to complacency.*

Key Takeaways

Operational readiness is a result of the combined efforts of a proficient and highly skilled workforce, i.e., a workforce that mitigates risk with every task and sustains its success by continuous improvement.

Mitigate risk by:

• **Following procedures.** Follow the appropriate publication specifying how to complete the task. Examples include: Interactive Electronic Technical Manual System - IETMS, Maintenance Requirement Cards - MRCs, SOPs, Checklists, etc. Read the Warnings and Cautions, they're there for your safety.

• **Using the right tool for the task.** Using the wrong tool not only increases risk to personnel safety but can also damage equipment, e.g., flight control surfaces, resulting in more maintenance needed. The technical publication for the task often specifies the tools needed. Additional info can be found in 'Tools and Their Uses - NAVEDTRA 14256A' on the Navy e-Learning platform.

• **Maintaining situational awareness.** Your situational awareness must be dynamic, not static. When a situation changes, your perception of it must also change and you have to adjust your actions accordingly.

• **And lastly … Recognize hinge points are danger zones.** STOP putting fingers in bolt holes to align them, to remove bushings or for any other reason. Your finger is no substitute for the high-strength bolt or pin that belongs there. Follow the procedures. Heed the warnings. Keep your fingers.

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