Maintenance Considerations in Hot Environments

As temperatures start to rise you can expect less performance from your aircraft and the people around you. Heat injury prevention measures in Technical Bulletin (TB) Medical (MED) 507/ Air Force (AF) Pamphlet 48-152(I), Heat Stress Control and Heat Casualty Management, are effective in aircraft maintenance operations and apply anywhere Soldiers could be exposed to heat stress. Excessive heat stress will degrade mental and physical performance capabilities and eventually cause heat casualties.

Heat stress slows reaction times, decision times and routine task performance. Heat categories are associated with a wet bulb globe temperature (WBGT) that is monitored at the location where work is being performed. The WBGT can vary greatly over short durations and distances in unpredictable ways, so a centralized wet bulb globe thermometer should only be used as a guide. Table 3-1 in TB MED 507 provides necessary water intake and ratios of work/ rest for easy, moderate, and hard work for each wet bulb category. Remember to read the notes below the table to see if they apply to your situation and apply them appropriately. In extreme temperatures scheduled and unscheduled maintenance may need to be performed at night to bring the risk down to an acceptable level.

Maintenance Test Flight (MTF) Considerations in High, Hot, Heavy Environments

1) High, Hot, Heavy Impacted Maneuvers to be performed along with altitude for safe operation/recovery.

CH-47

There are a few considerations for CH-47s in high, hot, and heavy conditions. Obviously, it is paramount to have a properly computed performance planning card (PPC) prior to any MTF. In high, hot, heavy conditions, the PPC will be your first indicator of some limitations that may exist prior to executing the MTF. Power becomes the limiting factor in this type of environment, and that translates itself to lower than normal airspeed limits and high autorotational rotor speeds. Speed sweeps checks and the autorotational RPM check will be the primary flight checks affected by this type of environment.

AH-64

The primary concern is the autorotational RPM check. Besides commonly having to conduct an alternate RPM check, the recovery generally takes more altitude due to a more methodical and slower manipulation of the flight controls. Briefers should ensure the maintenance test pilot (MTP) is aware of PPC limits and ensure the MTP is using an appropriate altitude for the maneuver.

UH-60

Power management during maintenance checks: Maximum engine power check, autorotational RPM check, Vibration and vibration absorber (AB) tuning (The propensity to reach turbine gas temperature (TGT) limiting rapidly as the cause of maximum power availability during high, hot and heavy

conditions); rapid increase of rotor RPM during autorotational RPM checks (expected RPMR over 120) especially with wide cord blades.

2) Configuration of aircraft (can you gain power margin by changing configuration).

CH-47

In accordance with (IAW) Technical Manual (TM) 1-1520-271-MTF, the aircraft configuration should be determined prior to each MTF in order to determine performance parameters. Clearly, the best way to combat this type of environment is to decrease one of the variables limiting performance. Given any specific environment at a given time, the only options an MTP may have are to reduce gross weight or wait for more favorable environmental conditions. In accordance with TM 1-1500-328-23, Aeronautical Equipment Maintenance Management Procedures, cargo and nonessential passengers are prohibited on all MTFs. Maintenance test pilots may need to evaluate the configuration of the aircraft and remove nonessential mission equipment (e.g., Extended Range Fuel System (ERFS).) Additionally, MTPs can limit the fuel in the tanks to only that which is needed to conduct a short limited maintenance test flight (LMTF) or burn fuel to attain a more desirable aircraft gross weight prior to attempting the checks in question.

AH-64

The AH-64 MTP should consider fuel required for the mission and possibly only take fuel required to complete the autorotational RPM check and then refuel if necessary for the remainder of the MTF. Also, reducing weight by removing wing stores is a good technique to increase the margin of power required vs. power available.

UH-60

As stated above, cargo and nonessential passengers are prohibited on MTFs. Removing ERFS and utilizing less internal fuel will increase power margin.

3) Time of day (day vs night) and benefits.

All MDS

The least demanding mode of flight (day) is the ideal mode to accomplish MTFs, however, certain environments and theaters may dictate the need for night/night vision goggle (N/NVG) MTFs. Maintenance test pilots can plan to reduce risk due to the high temperatures experienced later in the day by executing early morning MTFs which decreases the need to plan for conducting MTFs during N/NVG flights.

4) Seasonal considerations.

All MDS

In high, hot, and heavy environments, it is common to be unable to verify what rotor RPM the aircraft stabilized at during the autorotational RPM check due to the limit being reached for maximum autorotation rotor speed as per the MTF checklist. Maintenance test pilots can make use of the cooler months in the winter to verify any aircraft that had an autorotational RPM check completed during the summer months or in a high, hot, and heavy geographic location the unit was deployed to. This will allow the MTF to provide a stabilized autorotation RPM verification prior to operating in an environment where environmental factors yield a target value outside of permissible limits.

Summary

Higher temperatures bring increased risk to maintainers, aircrews, and reduced performance from aircraft and personnel. When extreme temperatures force maintenance actions to be performed at night, more vigilance is required from everyone involved. Leaders must ensure controls are in place to reduce risk to the lowest level possible. Maintainers must adjust work cycles to provide the maximum maintenance while protecting the force. And aircrews must apply high, hot, and heavy risk controls into their mission planning to complete MTFs. ■

References:

Army Techniques Publication (ATP) 3-04.7, Army Aviation Maintenance (September 2017)

Technical Manual (TM) 1-1500-328-23, Technical Manual Aeronautical Equipment Maintenance Management Procedures (June 2014)

Technical Bulletin (TB) Medical (MED) 507/Air Force (AF) Pamphlet 48-152(I), Heat Stress Control and Heat Casualty Management (March 2003)

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HIGH, HOT, AND HEAVY: SOME FACTS

Aircraft, rated and non-rated crewmember performance are always challenged by operating in high, hot, and heavy environments. These typically are associated with summer months in most geographic locations in the Continental United States (CONUS) while outside CONUS or OCONUS, Army aviation operations can find these challenging conditions throughout the year. The Army aviation branch has spent numerous man-hours and ink to develop and produce products which were designed to give aviation personnel the tools necessary to train for these operations and to reduce the risk inherent in high, hot, and heavy environments.

Let's take a look at some of these tools and risk reduction measures. Remember to include your non-rated crewmembers in the training program, their readiness to operate in high, hot, and heavy environments is just as important as the aviators in reducing risk to mission and force.

Hot Weather Operations

Training Circular (TC) 3-04.4, Fundamentals of Flight, Chapter 3, Section II covers operations in hot weather environments in detail. The TC's statement, "A region of environmental extremes, it has violent and unpredictable changes in weather and contains terrain not conforming to any particular model." is very accurate in reflecting the hazards to Army aviation when operating in hot weather environments. From reading the Blast from the Past HAATS article, you may have a better understanding of the power margins when operating in high, hot, and heavy conditions and how to utilize planning and training to develop effective risk mitigation measures. A thorough review of TC 3-04.4 will refresh you and your team's environmental training program so you stay sharp when conducting operations training and operations in hot weather conditions whether CONUS or OCONUS.

While classes and refresher training on the latest materials relevant to operations in high, hot, and heavy environments are the starting point, the unit standardization section should have a valid training program to put the classroom training to hands-on training in the simulator and aircraft. Developing rigorous situational training exercises in the simulator which put the aviators in heavy aircraft then subjected to high, hot, and heavy missions which require them to utilize their knowledge of the environment and effective decision-making to execute the missions will provide the unit aviators an opportunity to build their high, hot, and heavy skill sets. Next, the aviators can then transition these skill sets to hands-on in the aircraft. Every effort should be exhausted to transition the skill sets honed in the simulator to the aircraft. Maximize efforts to "load" the aircraft with weight so when conducting training the aviators must effectively use their learned power management skills and performance planning calculations. All aviators should have a far better understanding, following training, of the criticality of maintaining rotor RPM, managing power and that they go hand-in-hand. Don't forget about using the Directorate of Training and Doctrine (DOTD) Flight Training Branch information for aviation personnel located online at Army Knowledge Online (AKO) at:

***NOTE from PS**: With AKO going away, DOTD Flight Training Branch is working on creating a new online library. Until it's available, you can contact them directly at:*

usarmy.rucker.avncoe.mbx.atzq-tdt-f@mail.mil

5 Questions

1. Where can I find information on hot weather environments?
2. There is no reason to do simulator training when I can just fly the aircraft and train for heavy operations. True/False?
3. The DOTD Flight Training Branch can be accessed on Army Knowledge Online (AKO.) True/False?
4. Commanders don't have any responsibility to ensure high, hot, and heavy training is conducted. True/False?
5. Non-rated crewmembers don't need incorporation to high, hot, and heavy training. True/False?