Holistic Approach for Determining a Helicopter's Airframe Interval for Depot Induction

Brooks, Craig L. [1], Benavides, Samuel[2]
[1]*Analytical Processes/Engineered Solutions (APES), Saint Louis, Missouri, USA*
[2]*USCG Aviation Logistics Center, Elizabeth City, NC., USA*

The US Coast Guard currently inducts MH-65 rotary wing aircraft into their programmed depot maintenance (PDM) overhaul approximately every 48 to 52 months. The primary purpose of the PDM is to inspect for structural corrosion and fatigue and if discovered, to repair the compromised structure. There are aircraft, however, that are prematurely—and thus unnecessarily—inducted into PDM because the aircraft are neither corroded nor are they cracked, resulting in a needless but expensive overhaul evolution. Other aircraft arrive in depot with corrosion beyond repair limits due to harsh and extreme environments of operations. The PDM interval is USCG mandated based upon the historic amount of corrosion observed, not from prescribed interval recommendations from either the Original Equipment Manufacture or FAA recommendations. A holistic evaluation and assessment of the MH-65 programmed depot maintenance process results in the following major findings and recommendations:

- The assessment process used a progressive decision making process for selecting high priority components to determine whether the component is to be considered as a "depot driver". Figure 2 shows the increased analytical considerations applied throughout the airframe structure addressing priority components.

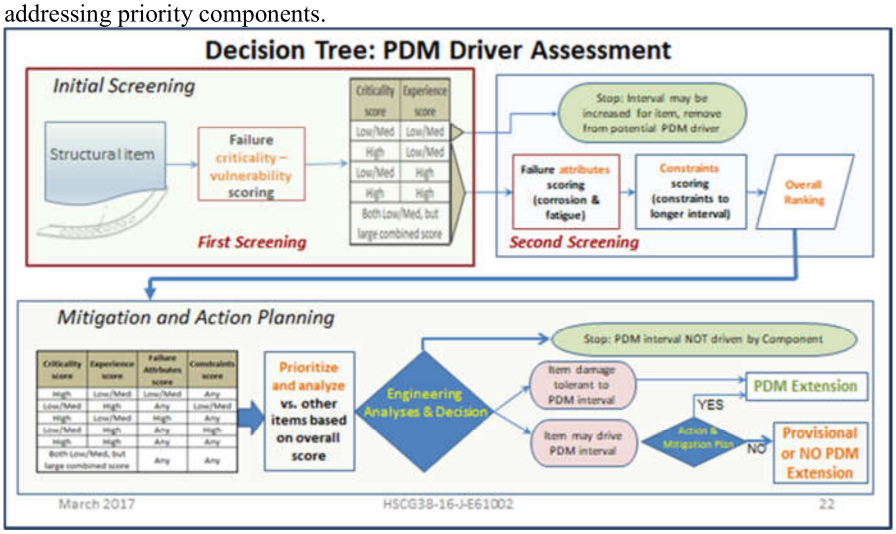

Figure 1. Progressive evaluation process applied to determine high priority components

- An analytical evaluation of the potential structural depot drivers was implemented to determine "Component Criticality and Prioritization". This process communicated key engineering structural integrity characteristics of components during the life cycle enabling maintainer to base decisions on engineering qualifications and quantifications.

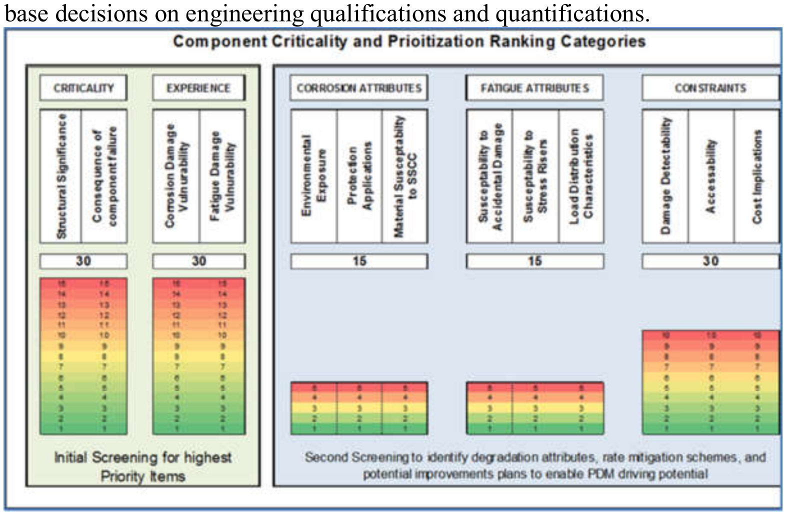

Figure 2. Component Criticality Assessment Process identified key structural integrity attibutes

- Corrosion and Fatigue Damage Tolerance Assessments (CDTA) were constructed to yield the depot induction interval that would capture the full airframe structure. Engine and transmission components are maintained independent of the airframe.

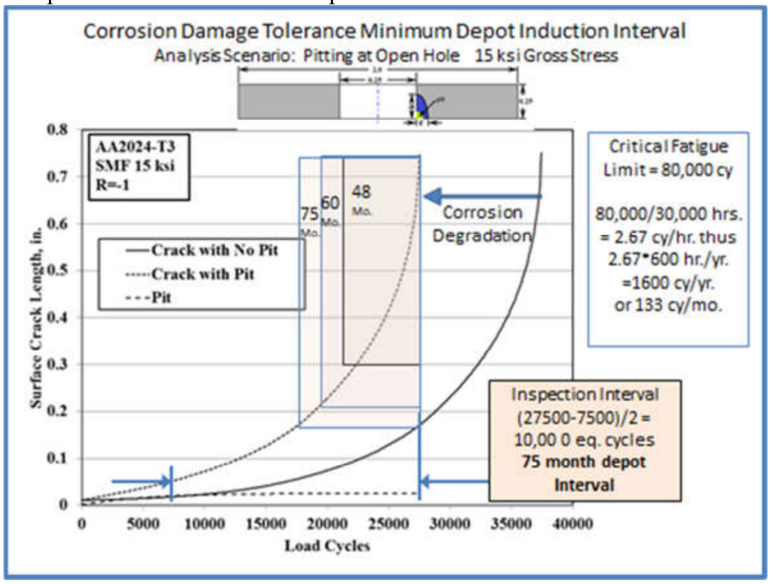

Figure 3. CDTA Sample analysis to establish needed inspection interval requiring depot

- Six PDM interval scenarios were examined considering the impact of induction intervals without compromise to airworthiness. The analytical CDTA intervals in conjunction with the scenario study resulted in an algorithm that enables provisions for unanticipated early aircraft induction and prioritizes aircraft operating in the more hostile environments while capturing the savings of extending the depot interval for most of the fleet.

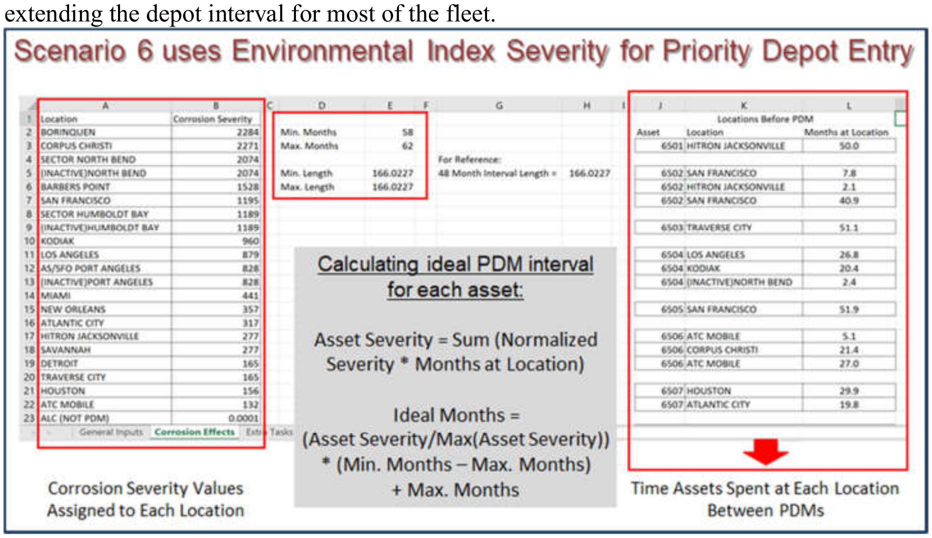

Figure 4. Scenario recommendation to capture extreme environment for priority depot entry

This depot induction process (labeled as PDM_OCP), where the fleet has a systematic Programmed Depot Maintenance period range that is dependent upon aircraft having On-Condition Priority positioning for entry in the PDM interval range by using more intelligent scheduling of aircraft to the depot based upon priorities. The Framework focuses on the use of an institutional "Aircraft Structural Integrity Program", presently evolving into "Rotor-aircraft Structural Integrity Program" (RSIP) with holistic considerations. Significant cost avoidances are afforded by implementation of the PDM extension taking into account all issues reviewed and analyzed. Technical tools were employed, issue mitigation schemes provided along with changes to the maintainer's infrastructure, and improvements to processes and procedures, all which collectively maximize the MH-65 asset's service life while maintaining safety, improving readiness, and avoiding unnecessary increasing PDM costs. The evaluation conducted indicates that the MH-65 can continue to operate safely while capturing significant maintenance cost avoidance by increasing PDM intervals, implementing component improvements, and moving toward condition based maintenance programs.

Keywords: Depot, corrosion, fatigue, damage tolerance assessment, component criticality assessment