Impact of Military Operational Tempo on Military Equipment Useful Life and Associated Reconstitution and Maintenance Costs

March 31, 2007

Executive Summary

Objective

The Office of the Under Secretary of Defense Comptroller (OUSD(C)), Accounting and Finance Policy Office was tasked with analyzing the effects of military operational tempo on the preservation and longevity of the Department of Defense (DoD)'s Military Equipment (ME) inventory. Through the first three tasks of the study, we developed a revised definition of depreciation (Task 1), created a methodology for application of the definition (Task 2), and conducted field visits with nine sample programs to test and validate the methodology (Task 3). The final tasks (Task 4 and Task 5) were to report on the results and analysis of the field work, and summarize the recommendations, to include how to incorporate the results into the Program, Planning, Budget and Execution (PPBE) process. The following is a summary of the key findings, conclusions, and recommendations.

Summary of Findings

1) **The DoD did not have a standardized and repeatable process for determining and documenting useful life estimates for Military Equipment.** For the sample programs included in this study, there was limited, and in some cases no supporting documentation to validate the initial useful life estimates used to develop the historical cost baseline for DoD ME as reported in the Capital Asset Management System – Military Equipment (CAMS-ME). Without a standardized approach for determining and supporting ME useful life estimates, program managers were unable to accurately support the values reported on the financial statements, which increased audit risk and continued unfavorable audit opinions for the DoD.

2) **Program managers relied on usage data, not years, when evaluating program aging, replacement, and maintenance requirements.** A disconnect existed between DoD financial reporting practices for ME that based useful life and depreciation calculations on a straight-line method using peacetime profiles and years and the information program managers used to manage and identify budgetary and funding requirements for their programs. DoD's financial reporting practice for ME understates the accumulated depreciation of ME reported on the financial statements and does not provide an accurate assessment of actual usage and age (net book value) of the asset. The Program Management Offices (PMOs) acknowledged this issue and recommended that useful life estimates be revised to account for usage and wear and tear.

3) **Usage rates and environmental operating conditions were the two factors that had the most significant affect on estimated useful life projections**. The PMO staff of the sampled programs indicated that changes to usage rates and the environmental hazards associated with mission profiles were most significant in contributing to asset fatigue and excess wear and tear. Accordingly, factors such as varying usage rates and environmental hazards particular to each program should be considered when analyzing the impact of increased operational tempo on assets estimated useful lives. Considering program-specific factors when determining ME useful life estimates allows the DoD to account for factors, such as mission profiles, that vary by program. Factoring this type of data provides a more reasonable and accurate assessment of the estimated useful life of ME.

4) **Most programs had multiple variants (types/models/blocks/series) that were used and configured differently based on mission-specific profiles. As such, useful life estimates should consider changes in mission profiles by variant.** Most programs assigned one useful life estimate for all assets in the program. For example, ME trainers, that do not operate in harsh conditions, used the same depreciation expense and useful life factor as assets used in theatre. The policy of straight-line depreciation based on years, primarily at the program-level, does not provide the program manager with the decisional information required to make sound business and financial decisions. Accurate collection and reporting by variants provides more useful information for decisional purposes.

5) **For fixed-wing aircraft, the primary factor affecting estimated useful life was fatigue flying hours (combat and hard-maneuvering operations).** Fatigue flying hours more accurately account for surges in usage than an estimate based on years. More accurate usage and fatigue information was available within the PMOs and should be considered when determining useful life estimates and depreciation calculations.

6) **For rotary-wing aircraft, the primary factor affecting estimated useful life was increased usage rates and fatigue caused by the operating environment (e.g., sand and weather).** As with fixed-wing aircraft, usage information was available within the PMOs and should be considered when determining useful life estimates and calculating depreciation.

7) **For most wheeled and tracked vehicles, the primary factor affecting estimated useful life was wear and tear due to the operating environment**. Program manager's expressed concern that the effects of the operating environment could not be accurately captured without meeting with the depot-level staff who assess damage as assets return from theatre. Similar to flying and fatigue hours for aircraft, critical maintenance and environmental information at the depots is needed to more accurately assess useful life estimates for wheeled and tracked vehicles. This level of analysis was not performed because of the limited time allocated for this study.

Summary of Observations

1) Special Operations Forces (SOF) programs considered some elements of combat operations into their useful life estimates. Although detailed supporting documentation was not available for review, the program offices applied variables to account for SOF mission profiles. This approach should be further researched for possible leveraging throughout the DoD.

2) The supplemental budget process does not appear to mitigate the effects of increased operational tempo, but instead assists with maintaining combat-readiness levels for DoD ME exposed to increased operational tempo. The PMO staffs were concerned that the increased operations and maintenance (O&M) funding was not mitigating the damage caused by the increased hours flown (miles driven) and harsh operating environments. Also, assets receiving capital (procurement and O&M funded) improvements were not being brought back to a "zero-hour" or "zero-mile" status. Increased O&M may have mitigated the short-term effects of increased operational tempo, but it does not mitigate the long-term effects.

3) In response to increased threats, programs requested newer variants that include increased capabilities to meet increased operational tempo, respond to the harsh environmental, and combat operating conditions. These newer variants should have a different useful life than their legacy predecessor platforms.

Conclusions

1) The DoD should move away from depreciating ME assets based on years, and move towards depreciation based on actual usage at the asset level. This will assist in providing more timely, accurate, and reliable information for decision makers as they plan for maintenance and new procurement.
2) The DoD should adopt an acceleration factor that addresses environmental operating conditions. This factor should be determined through further research at the depot-level maintenance facilities.
3) The DoD should move towards asset level accounting and reporting to determine the appropriate useful life schedule per variant and at the asset level.
4) The DoD should incorporate the effects of increased operational tempo analysis in the PPBE process by adding depreciation schedules into Program Objectives Memorandum (POM), planning guidance, and Budget Exhibits.

Summary of Recommended Next Steps

1) Finalize the data collection and analysis on the initial sample of nine programs. This includes collecting fatigue data for all of the programs and more data on the HMMWV programs. Through conversations with the PMOs this data should be available at the depots. Therefore, depot-level site visits should be arranged to further analyze and determine a quantifiable factor to be applied to the methodology/tool to assist PMOs in determining the impact of increased usage and wear and tear on their platforms. Environmental factors and maintenance cost information obtained from the depots will be significant in determining the most critical factors that effect useful life.
2) Determine the subset of ME programs subject to increased operational tempo and apply the methodology (estimate is 50 to 100 programs). Due to the intricacies of each program, analyzing the complete population and factoring program specific data is the only way to get accurate and reliable results. Based on the results of the first phase of this study, the work at the additional program offices will be more efficient and less labor intensive.
3) Establish a standard/repeatable approach to include an implementation tool and requisite policy/guidance for DoD-wide implementation. This approach should be coordinated with the OUSD(AT&L) P&E Policy Office, OSD(PA&E), JROC, PB, and the Components, and an implementation/roll-out plan should be established.
4) Assist the Components with implementation of the accelerated depreciation methodology and with updates to CAMS-ME.
5) Complete a "pilot program" to demonstrate the approach for adding depreciation schedules into the POM, planning guidance, and Budget Exhibits.

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1 Introduction

The Office of the Under Secretary of Defense Comptroller (OUSD(C)), Accounting and Finance Policy Office was tasked with analyzing the effects of military operational tempo on the preservation and longevity of the Department of Defense (DoD)'s Military Equipment (ME)[1] inventory. Equipment modernization and reconstitution issues associated with current operations test present ME estimated useful life and subsequent depreciable expense projections. As a result, the DoD must consider whether the initial estimated useful life calculations should be modified to account for changes in operational tempo due to combat and contingency operations.

This report summarizes the results of Tasks 1 through 3 and completes the requirements of Tasks 4 and 5. It provides a comparative analysis of the estimated useful life projections and associated depreciation schedules currently being reported with those developed using the methodology developed in Task 2 for the nine sample ME programs. The report also provides recommendations and an approach for future projections based on the results of this study (Task 4) and how to incorporate the results into the Program, Planning, Budget and Execution (PPBE) process (Task 5).

2 Task 1 Results: Provide a Definition of Depreciation

The DoD Financial Management Regulation (FMR) does not require DoD to account for fluctuations in ME usage due to combat, contingency operations, changes in mission readiness activities, or operating conditions when calculating the estimated useful life and associated depreciation expense for ME.

The estimated useful life currently used in the depreciation calculation for ME assets is provided by the Program Management Office (PMO) and is based on engineering estimates, historical experience, or warranty information. This information typically does not factor increased usage rates during combat and contingency operations or environment (e.g., harsh weather, rocky terrain, asphalt, sand, etc.). In addition, most of the estimated useful life projections are based on peacetime profiles.

Based on numerous studies and reviews, such as those conducted by the Office of the Secretary of Defense (Program Analysis and Evaluation) (OSD(PA&E)), Institute for Defense Analysis (IDA), and RAND Corporation (RAND), it was determined that the usage rate of assets used in combat and contingency operations is typically significantly greater than peacetime rates. In current combat operations, equipment usage rates have run two to eight times higher than comparable peacetime rates.[2] For example, in April 2005,

[1] Office of the Under Secretary of Defense, Acquistion, Technology, and Logistics Military Equipment Definition Memorandum (January 2007). Definition of Military Equipment – "Weapon systems that can be used directly by the Armed Forces to carry out battlefield missions. Military equipment has an expected useful life of two or more years; is not intended for sale in the ordinary course of business; does not ordinarily lose its identity or become a component part of another article; and is available for the use of the reporting entity for its intended purpose. Examples include: combat aircraft, pods, combat ships, support ships, satellites, and combat vehicles. Examples excluded are training aircraft and simulators."

[2] Office of the Secretary of Defense, Ground Force Equipment Repair, Replacement, and Recapitalization Requirements Resulting from Sustained Combat Operations (April 2005), p. 2.

OSD PA&E reported that the usage rate for the Army's High Mobility Multipurpose Wheeled Vehicles (HMMWV) was up by a factor of 3.3. This increased usage typically results in accelerated wear and tear and overall accelerated maintenance cycles. Additionally, the House Committee on Appropriations reported that one to two months' worth of current combat operations is equivalent to roughly a year's worth of peacetime activity.[3]

Based on the results of this study, the OUSD(C) Accounting & Finance Policy office will review and update the definition of depreciation to account for increased operational tempo. The revised definition is as follows:

Depreciation is the systematic and rational allocation of the acquisition cost of an asset, less its estimated salvage or residual value, over its estimated useful life. Estimates of useful life of general PP&E must consider factors such as physical wear and tear and technological change.

3 Task 2 Results: Develop a Methodology for Application of the Definition

To obtain the required data to apply the methodology and analyze the results, KPMG met with PMO personnel to gather information for periods of both high (combat) and normal (peacetime) operational tempo for the following factors. Because of the limited time available for this study, the analysis was constrained to these factors.

- Usage (miles, flying hours, etc.)
- Total assets
- Assets in combat
- Combat losses
- Increased load (up-armor)
- Mission capable rate (MCR)
- Wash-outs (assets disposed instead of maintained)
- Time between depot maintenance
- Depot maintenance cycle time
- Procurement funding
- O&M funding (total, depot, and field)
- Cost per depot maintenance action
- Maintenance ceiling
- Environment/terrain
- Accelerated technology cycles

[3] House Committee on Appropriations, *Department of Defense Appropriations Bill, 2005*, Report: 180-553 (June 18, 2004), pp. 107-108.

Using the data collected, we performed regression analyses to determine the effects of these variables on a primary/dependent variable, usage (miles, flying hours, etc.), as it seems to have the greatest impact on estimated useful life based on discussions with the PMOs. The relative fit of each factor was then identified and the three factors having the closest relative fit were used in the final regression results. The results were computed, and comparisons were made to determine whether a statistically valid accelerator could be developed for a particular ME program. If so, this factor can be used to estimate the impact of increased operational tempo on historic maintenance and useful life estimates for the program.

A statistical regression modeling procedure, "The Method of Least Squares", was used to generate the explanatory equation which correlates the movement of an important dependent variable with the movement of one or more independent variables. This type of model is heavily data-driven, and therefore required sufficient information over time to properly represent any patterns. As a result, we requested data from the PMOs for fiscal years 1999 through 2007. We understood that it was likely that some factors would fall out of the equations based on the availability of data. Factors can fall out because there is not enough data available or the data available does not have an effect on the dependent variable. It was expected that different factors would fall out for different programs. Therefore, it was important that we collect data on all of the identified factors for each program to ensure we had the most complete data prior to modeling.

4 Task 3 Results: Apply the Methodology and Conduct Valuation Sampling

4.1 Sampling Plan

In preparation for Task 3, KPMG in coordination with the P&E Policy Office reviewed the DoD Military Equipment Program universe and identified potential programs for further evaluation. The programs were selected using institutional knowledge from the Military Equipment Valuation (MEV) initiative, recommendations made by OUSD(C), and program reviews in similar studies conducted by OUSD(PA&E) and the Government Accountability Office (GAO). To determine the set of programs, consideration was also given to the following criteria:

1) Include programs from all DoD Components;
2) Include multiple asset/program classes;
3) Include only programs supporting Global War on Terror (GWOT) related combat or contingency operations; and
4) Include programs geographically co-located to minimize cost and maximize coverage.

The following programs were selected and site visits were conducted on the dates listed.

Program (Location)	Date(s)
CH-47 (Huntsville, AL)	January 8, 2007
GMV (Tampa, FL)	January 10, 2007
Abrams – Army (Warren, MI)	January 16, 2007
HMMWV – Army (Warren, MI)	January 17, 2007
C-17 (Dayton, OH)	January 18, 2007
Abrams – USMC (Quantico, VA)	January 22, 2007
HMMWV – USMC (Quantico, VA)	January 23, 2007
F/A-18 (Patuxent River, MD)	January 25, 2007
MH-47 (Ft. Eustis, VA)	January 29, 2007

5 Task 4 Results: Report on Tasks 1 through 3 with Analysis & Recommendations

5.1 Summary of Findings

5.1.1 Issues

1) Current DoD practice for financial reporting of ME is to depreciate assets based on years not usage using a straight-line method. With the exception of the Special Operations Command (SOCOM) Special Operations Forces (SOF) programs (GMV and MH-47), the estimates used to depreciate ME assets for the sample programs were based on peacetime profiles and did not factor increased usage or wear and tear resulting from operational surges and combat usage. When asked, each program manager stated that usage and wear and tear should be evaluated when determining useful life projections in the future.

2) The DoD does not have a standardized process for determining and documenting useful life estimates for ME and does not consistently maintain documentation supporting the useful life estimates. For the sample programs included in this study, there was limited, and in some cases no supporting documentation to validate the initial useful life estimates used to develop the historical cost baseline for DoD ME as reported in the Capital Asset Management System – Military Equipment (CAMS-ME). Without a standardized approach for determining and supporting ME useful life estimates, program managers were unable to accurately support the values reported on the financial statements, which increases audit risk and continued unfavorable audit opinions for the DoD.

3) Program managers relied on usage data when evaluating program aging and replacement and maintenance requirements. A disconnect existed between DoD financial reporting practices for ME that based useful life and depreciation calculations on a straight-line method using peacetime profiles and years and the information program managers used to manage and identify budgetary and funding requirements for their programs. DoD financial reporting practice for ME understates the accumulated depreciation of ME reported on the financial statements and does not provide an accurate assessment of actual usage and age (net book

value) of the asset. Program managers can better rely on usage information as an indicator of needed maintenance or replacement than straight-line depreciation based on an estimated service life in years. The PMOs acknowledged this issue and recommended that useful life estimates be revised to account for usage and wear and tear.

4) Each ME program faced unique challenges resulting from increased operational tempo due to combat and contingency operations. Accordingly, factors particular to each program were considered when analyzing the impact of increased operational tempo on an assets' estimated useful life. For example, mission and environment operating profiles vary by program. A change to the estimated useful life of a program must be sensitive to these variations and consider program-specific information such as usage, operating environment, fleet size, and mission profiles.

5) Usage rate and environmental condition (terrain and weather resulting in corrosion and structural damage) appear to be the two factors that had the most significant affect on an ME program's estimated useful life projection. While several other factors were considered in the study, usage rate and environment appeared to be the leading contributors to the aging of the fleet and the root cause for program managers to consider revising their initial useful life calculations. When asked, PMO representatives responded that these two factors were the primary variables that would lead to a revision of the estimated useful life of the program to account for increased usage and physical wear and tear.

6) Most ME programs have multiple variants (types/models/blocks/series) and depending on mission requirements and profiles (i.e., training, border surveillance, combat engagement, etc.) the assets within the program were used and configured differently. Most programs included in the sample did not send all variants into combat and contingency operations. As such, useful life estimates for a particular program may fluctuate by variant. Assigning one estimated useful life for the entire program does not provide the detail a program manager requires to make business and financial decisions. Assigning useful life estimates by variant within a program will allow programs to more accurately account for mission profile changes within the program and allow for the accelerated depreciation of those variants routinely experiencing increased usage due to combat and contingency operations.

7) For aircraft, the primary factor contributing to accelerated depreciation in most cases is fatigue flying hours. Airframes are designed to fly a maximum number of hours before they require modifications and recapitalization. The hours available for use for an airframe remain constant unless the airframe is recapitalized. As fatigue flying hours increase, the airframe loses useful life at an accelerated rate. To accurately capture and account for surges and sustained spikes in usage, calculating an airframe's useful life based on usage rate is a more accurate and realistic than an estimate in terms of years.

8) For wheeled and tracked vehicles, the primary factor contributing to accelerated depreciation in most cases is the operating environment. Fatigue caused by stress,

corrosion, and combat damage that result in recapitalization and reset requirements is the best available data to determine the impacts of increased operational tempo on these programs. PMO representatives expressed concern that this study could not accurately capture the effects of excess wear and tear on equipment or associated maintenance and reconstitution requirements without meeting with the depot-level staff who deal with these problems and assess the damage for the program.

5.1.2 Observations

9) SOCOM SOF programs (MH-47 and GMV) have begun to consider elements of increased wear and tear resulting from combat operations into their useful life estimates. The PMOs evaluated peacetime useful life estimates provided by the legacy Component PMOs (Army CH-47 and Army/USMC HMMWV) and applied an acceleration factor internal to the program to provide a better estimate of the anticipated useful life of the program based on their historical and institutional knowledge and current depot-level maintenance cycles for those assets subject to combat and contingency operations. While detailed supporting documentation was not available for our review, the SOF programs do appear to be applying variables to attempt to account for operational tempo for SOF-particular mission profiles.

10) Increased operational tempo resulted in increased Operations and Maintenance (O&M) requirements and funding requests achieved through the supplemental budget process. However, when asked, PMO representatives did not believe that the increased maintenance expenditures were reducing the overall impact of increased operational tempo. Without recapitalization, increased O&M expenditures were not buying back hours flown or miles driven as a result of increased operational tempo. In addition, assets receiving recapitalization improvements through supplemental funding were not being brought back to a "zero-hour" or "zero-mile" status. The fatigue, stress, and extensive damage to these platforms were not fully addressed or mitigated through these efforts. The entire sample of PMOs believed that the increased O&M expenditures were not mitigating the long-term effects of the spikes in usage.

11) It appears there is a movement away from spending procurement dollars for funding modifications and service-life extension programs (SLEP) for legacy programs due to demands for newer variants (types/models/blocks/series) that have the built-in capabilities to meet increased operational tempo and respond to environmental and operating conditions (terrain, weather, sand, etc.). For example, new variants of the HMMWV were planned with more robust chassis and transmission configurations and up-armor capabilities not always available on legacy platforms. These new variants were designed to respond to changes in DoD's mission profiles and likely have different estimated useful lives than their predecessors.

5.2 Summary of Recommendations

5.2.1 Response to Issues

1) Finalize the data collection and analysis on the initial sample of nine programs. This includes collecting fatigue data for all of the programs and more data on the HMMWV programs. Through conversations with the PMOs this data should be available at the depots. Therefore, depot-level site visits should be arranged to further analyze and determine a quantifiable factor to be applied to the methodology/tool to assist PMOs in determining the impact of increased usage and wear and tear on their platforms. Environmental factors and maintenance cost information obtained from the depots will be significant in determining the most critical factors that effect useful life.

2) Conduct a review of current DoD standards for determining estimated useful life projections to evaluate how the initial estimates were determined and what they were based on (mission profile, flight/fatigue hours, mileage, etc.) to identify the process and policy gaps that need to be addressed to allow program managers to begin revising their useful life projections to account for increased operational tempo. This review should include standards for documentation in support of current useful life estimates.

3) Establish a standard approach and requisite policies and procedures to assist with DoD-wide implementation of an accelerated depreciation method for ME programs and variants experiencing increased operational tempo. This approach should include guidance on documentation in support of useful life estimates and accelerations.

4) Develop useful life projections and accelerators that consider unique factors by variant within each program. The DoD methodology for determining an acceleration factor for revising a ME program's useful life projection to account for increased operational tempo and usage should be sensitive to and consider program unique conditions, such as mission profile and operating environment. The DoD should move away from basing useful life estimates and depreciation expense calculations on years and begin basing them on usage.

5.2.2 Next Steps

5) Expand the scope of this study to include all programs subject to increased operational tempo as a result of current combat and contingency operations. The current sample, nine programs, is not representative of all programs in the DoD inventory. Due to the intricacies of each program, analyzing the complete population is the only way to get accurate and reliable results.

6) Identify the subset of ME programs subject to increased operational tempo as a result of current combat and contingency operations to determine the number of ME programs that may require a revision to their initial estimated useful life projections. We estimate the number of programs affected to be between 50 and 100.

7) Develop and implement a tool that allows for program-specific variables and provides the user with a supportable and quantifiable acceleration factor to be applied to the ME program to account for program specific conditions and varying levels of operational tempo as mission profiles change. This tool should be CAMS-ME enabled and integrated into year-end CAMS-ME financial closing processes.

8) Assist and oversee the implementation of the accelerated depreciation methodology for those programs subject to increased operational tempo due to combat and contingency operations. This effort should be centrally managed and worked in coordination with the P&E Policy Office.

9) Incorporate depreciation schedules into the Program, Planning, Budget, and Execution (PPBE) process (as Budget Exhibits) and the DoD Financial Management Regulation (FMR) to provide decision makers with decision quality information and further leverage the financial reporting process in the PPBE process.

5.3 Estimated Useful Lives and Acceleration Factors

The following table shows the estimated useful life under normal (peacetime) operating conditions and the acceleration factors for the estimated useful life based on the information provided by the PMOs.

Program	Normal (Peacetime) Estimated Useful Life	Potential Acceleration Factor	Multiplier Effect of Fatigue on Acceleration Factor
CH-47	20 Years	39.84%	Inconclusive
C-17	30 Years	19.08%	Inconclusive
F/A-18	20 Years	30-35%[1]	Inconclusive
Abrams (Army): M1A1	20 Years	44.1%	Inconclusive
Abrams (Army): M1A2	20 Years	344.84%	Inconclusive
Abrams (USMC)	20 Years	44.31%	Inconclusive
MH-47	20 Years	50%[2]	Inconclusive
GMV	15 Years	67%[2]	Inconclusive
HMMWV (Army)	15 Years	Inconclusive[3]	Inconclusive
HMMWV (USMC)	15 Years	Inconclusive[3]	Inconclusive

[1] F/A-18 conducted a detailed in-house review into the effects of increased operational tempo on the program. The results of that review were used in lieu of regression analysis. See section 6.3 for details.

[2] The two SOCOM programs considered elements of increased operational tempo when determining the initial estimated useful life. The acceleration factors are reflected in the estimated useful life currently being used for depreciation purposes in CAMS-ME.

[3] The regression analyses for these programs did not yield conclusive results.

5.4 Constraints and Limitations

Due to contract time limitations, the sample size to test, validate, and analyze the methodology was limited to nine ME programs. The sample programs crossed all Components, covered five asset classes, and were all supporting combat and contingency operations. It was expected that this sample would provide a reasonable representation of assets that may be subject to accelerated depreciation due to increased operational tempo. However, this sample and the results of this effort are not intended, and should not be interpreted, as representative of the entire DoD inventory of ME. The methodology and application of results should be evaluated for each ME program experiencing increased operational tempo as a result of combat and contingency operations.

The limited time available did not allow for verification and validation of the data collected from the program offices. As a result, the results are only as accurate and valid as the data provided by the program offices.

The outcome of the sampling and the ability to report our findings was directly correlated to the availability of requisite program information. Our modeling procedure was heavily dependent on the availability of data. The more detailed the data is in terms of time scale (daily, weekly, monthly, quarterly, or yearly), the more factors we were able to use in the regression equation. Since data was only available by fiscal year, we could only use a maximum of three factors in the final regression equation. As a result, we performed a regression for each factor, where data was available, against a dependent variable (usage when available) to determine which three factors were the best fit for the final regression analysis.

6 Program Specific Findings

While there were some consistencies across programs observed, there were far more program-specific issues that drive the need for adjustments to the estimated useful life and accelerated depreciation. The following sections of this report provide a brief description of each program, the key findings from the PMO meetings, and our results and recommendations by program.

6.1 Army CH-47 (Rotary Wing Aircraft)

Program Description

The CH-47 Chinook helicopter provides for transportation of troops, artillery, supplies, and equipment to the battlefield. Other roles include medical evacuation, aircraft recovery, parachute drop, search and rescue, disaster relief, firefighting, and heavy construction.

Key Findings

- The estimated useful life was taken from the Army Cost Manual, which did not factor increases in operational tempo due to combat and contingency operations, and uses peacetime profiles.
- Usage rates for current operations were averaging 50 hours per month, which was up significantly from the 12-15 hours per month in peacetime operations, which the initial useful life projections were based on for the MEV effort.

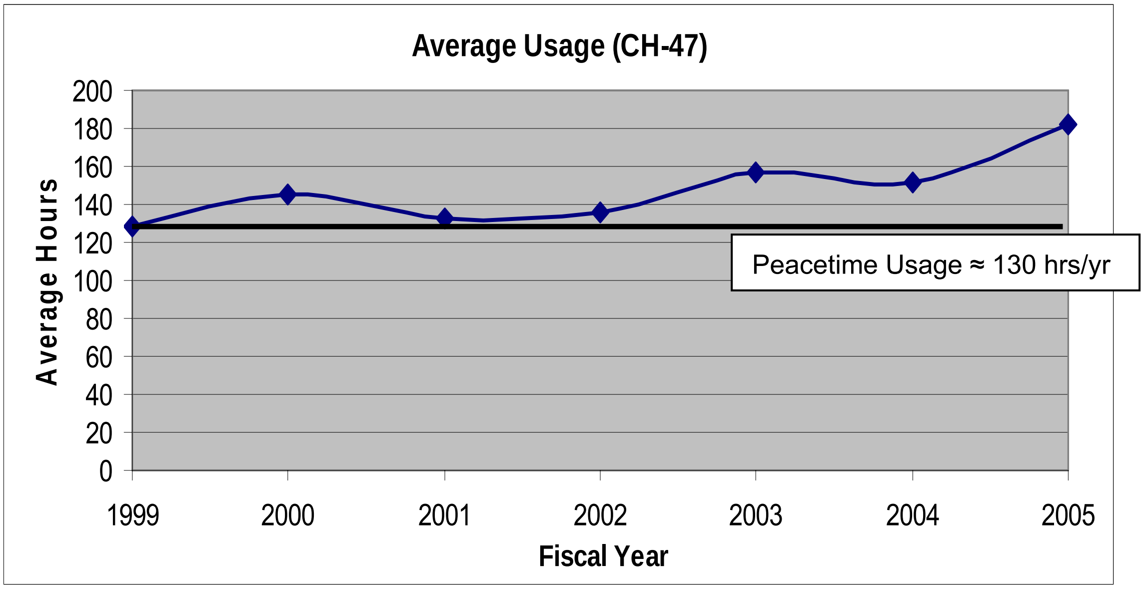
- Many aircraft were not receiving timely and scheduled depot-level maintenance due to limited funding and availability to remove aircraft from the field for overhaul.
- All disposals were due to combat loss or for Military Equipment Valuation tracking purposes, entry into the re-model process (change from CH-47D to CH-47F). Aircraft were not washed-out of the CH-47 program for maintenance reasons. The aircraft could be stripped down and rebuilt with entirely new components, but this process did not return the aircraft to a new or "zero-hour" status. When a CH-47 was recapitalized, all components were brought back to a like "zero-hour" status, and the airframe was overhauled but still exhibited all the hours of usage on numerous serviceable structural components.
- O&M expenditures outside of recapitalization efforts did not reduce the impact of increased flying hours for the CH-47 program.

Regression Results

The regression yielded conclusive results, and the factors that aligned best with usage through the regression analysis were those that were identified during the PMO site visit and documented in the questionnaire completed by the program as factors that would have an effect on the estimated useful life. These factors were usage, total number of assets, number of combat losses, and total O&M funding. Therefore, we projected that as usage increased the useful life for the program decreased.

Acceleration Recommendation

The following chart shows the average usage per year from FY99 through FY05. FY06 usage data was not available. The program began to experience increased operational tempo in FY00 due to combat and contingency operations. The straight line is the average peacetime usage per the program office (130 hours/year). Based on this data we recommend that the program accelerate depreciation based on the percentage increase in usage (hours) each year. For example, in FY05 the average usage was 181.79 hours, which was a 39.84% increase over the average peacetime usage. If this usage trend continues, the program will experience a loss of approximately eight years of life for those assets subject to increased operational tempo.



6.2 Air Force C-17 (Fixed Wing Cargo Aircraft)

Program Description

The C-17 is a long range, air-refuelable, turbofan powered, high wing, heavy military cargo aircraft built around a large unobstructed cargo compartment. It is powered by four Pratt & Whitney F117-PW-100 turbofan engines, and has a swept wing that uses supercritical air foil technology and winglets to achieve good long-range cruise performance. The C-17's combination of design features and technologies, allows operations utilizing short run-ways and austere air fields.

Data related to the C-17 program was obtained during the site visit, however was not validated with supporting documentation. The C-17 PMO did not have the level of detail necessary to respond to the data requested for this study. The C-17 PMO forwarded the data request to Headquarters Air Mobility Command (HQ AMC), but HQ AMC did not provide all of the requested information necessary to perform a regression analysis for inclusion in this study. They did, however, provide a chart with usage data (flight hours) and the total number of aircraft by fiscal year. This information is outlined in the chart below to show the usage trends for the program.

Key Findings

- The estimated useful life reported in CAMS-ME was based on an engineering estimate of 30,000 flying hours divided by the average hours flown per year (1,000) in peacetime. The 30,000 hour estimate is documented in the Systems and Air Vehicle Specifications for the program.
- The PMO did not believe the 30,000 hour estimate was affected by increased operational tempo as it managed the life of the aircraft by hours, not years, and tracked the aircraft by hours flown. However, the useful life in years should

decrease because the average hours flown per year increased due to combat and contingency operations.

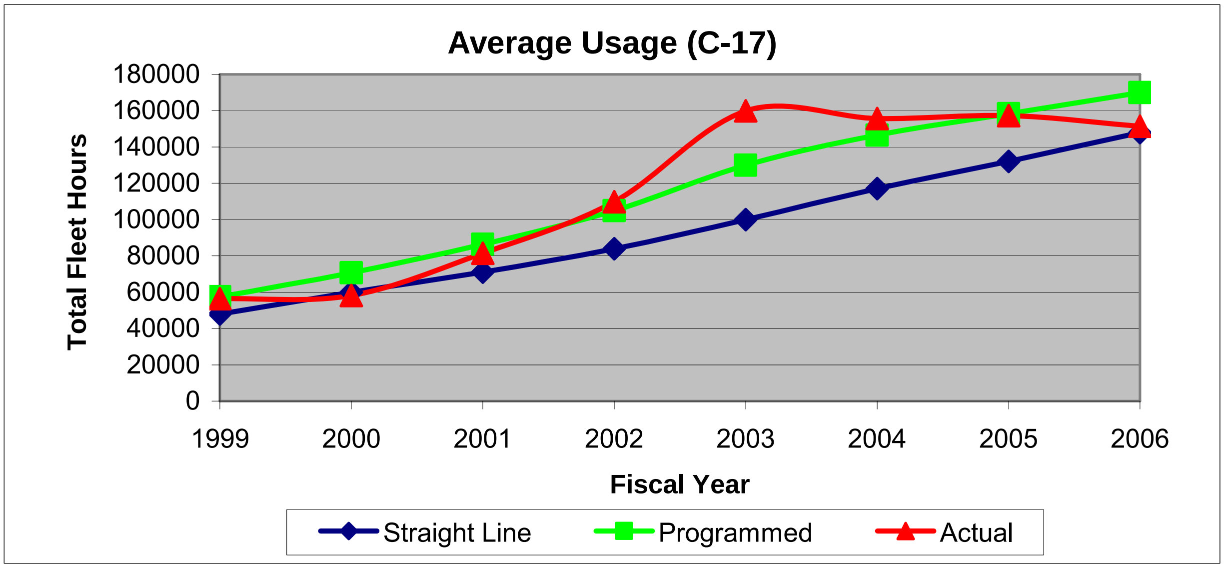
- Assets were brought in for Home Station Checks (HSC) every 120 days to perform depot-level maintenance that could not be covered at the field-level. Prior to combat and contingency operations, the aircraft did not go through HSC. Increased maintenance needs were the driver for HSC.
- All maintenance for the program was provided under the Contractor Logistics Support (CLS) contract vehicle with Boeing.
- Every three years, the aircraft underwent a modification and upgrade process to add capability to the aircraft. Some maintenance was performed during this process but the primary goal was modification and upgrade.
- The fleet was rotated to balance flight hours, so all assets faced nearly the same number of hours under combat and contingency conditions.

Regression Results

The C-17 program office provided a limited amount of data during our site visit; however it was at a very high level and did not provide the type and level of detail necessary to completely satisfy the data request. As a result, we were unable to do a regression analysis for the program. Therefore, we can only recommend that the estimated useful life in years, being used in CAMS-ME, be adjusted (decreased) based on the increased flying hours per month against the 30,000 flight hours estimated useful life.

Acceleration Recommendation

Additional analysis was performed on the data provided to determine a preliminary acceleration factor due to the increase in operational tempo based on usage. The chart below shows flying hour information and the average number of assets by year for the C-17 program. To determine the preliminary acceleration factor for the C-17 program, we compared the straight-line usage by fiscal year with the actual usage per fiscal year. The percentage increase per fiscal year was used to calculate a program-level multiplier to assist with accounting for the surge. The program experienced increased usage from FY01 through FY05 due to an increased operational tempo. The program began flying considerably more hours during that timeframe than the standard 1,000 hours per year that the assets were intended to fly based on their 30 year/30,000 hour estimated useful life. It is evident by this data that the flying hours were being consumed at a much faster rate during periods of increased operational tempo than during peacetime (straight-line). For example, in FY05 the actual usage was 157,189 hours as opposed to a peacetime (straight-line) usage of 132,000 hours, which was an increase of 19.08%. If the total actual hours flown from FY99-FY05 are compared to the straight-line hours for the same period, an equivalent of an additional 5.5 aircraft would have been consumed. However, if the total programmed hours were compared to actual usage over the same time period less than one additional aircraft would have been consumed. Additional discussion with the program office and HQ AMC is necessary to understand how programmed hours were calculated.



6.3 Navy/USMC F/A-18 (Fixed Wing Combat Aircraft)

Program Description

The F/A-18 Hornet is a fighter/attack airplane that can be configured quickly to perform either fighter or attack roles, or both, through selected use of external equipment to accomplish specific missions. This "force multiplier" capability gives the operational commander more flexibility in employing tactical aircraft in a rapidly changing battle scenario. The fighter missions are primarily fighter escort and fleet air defense; while the attack missions are force projection, interdiction, and close and deep air support.

Key Findings

- Aircraft with more capabilities were used more often in combat and contingency operations thus driving up the usage for the newer aircraft in the fleet.
- Prior to Operation Iraqi Freedom (OIF), the PMO anticipated a 30-35% increase in operational tempo and factored this into their internal monthly flying hour projections.
- The PMO tracked flying hours and fatigue hours by tail number. The manner in which the aircraft were flown determined if flying hours or fatigue hours were recorded.
- Fatigue hours are not the same as flying hours and should not be reported as such.
- USMC Aircraft used in OIF were greatly affected by corrosion and dust because they were not kept in hangars when in the desert.
- Depot-level maintenance was not scheduled based on flying hours or usage, but instead was based on calendar time. The cycle was every four years for sea-based aircraft and six years for land-based aircraft.

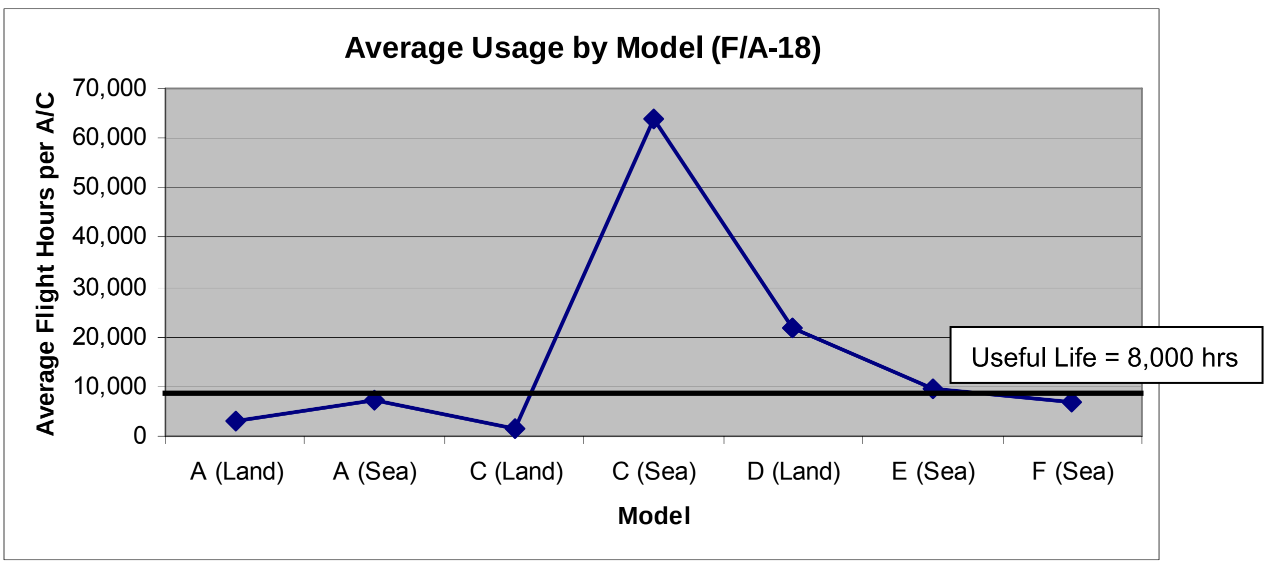
- Aircraft were subject to a Service Life Assessment Program (SLAP) at the field level to assess the need for higher level (depot) maintenance.
- The program office believed that flying hours, fatigue hours, wing route, catapults (take-offs), and traps (landings) had the greatest affect on the estimated useful life.

Regression Results

We did not conduct a separate regression analysis for the program based on the data provided during the PMO visit. The program had recently completed an in-house analysis on the effects of increased operational tempo on their assets which was in much greater detail than our work on the other programs. Therefore, we determined that it would be best to use the information gathered by the program office without further analysis for this study.

Acceleration Recommendation

The F/A-18 PMO analysis used information on the structural limitations of the aircraft (flight hours, fatigue hours, catapults, and traps) to determine how many aircraft had been consumed due to OIF operations. The results provided were similar to the other program findings and regression results from our study. The PMO study showed that fatigue and flight hours were the primary drivers for the accelerated depreciation of the fleet, and that the equivalent of 12.261 F/A-18A-D and 2.07 F/A-18E/F aircraft have been consumed due to OIF operations.



6.4 Army Abrams (Tracked Vehicle)

Program Description

The mission of the Abrams tank is to close with and destroy enemy forces on the integrated battlefield using firepower, maneuver, and shock effect. The Abrams has the 120mm main gun, the powerful 1500 HP turbine engine, the specialized armor, and the levels of nuclear, biological, and chemical protection make it particularly suitable for attacking or defending against large concentrations of heavy armor forces on a highly lethal battlefield.

Key Findings

- The estimated useful life was cost-based, as opposed to accounting-based, and increased operational tempo was not considered in the formulation. However, the PMO believes the original useful life was proving valid. The assets were reaching their estimated useful life, but the maintenance required was more frequent and extensive.
- The PMO believed changes in operational tempo should be considered in estimated useful life projections, but it was difficult and impractical to obtain the data necessary to incorporate it. From a logistics standpoint, they responded to demand, and did not have a method to determine demand based on operational tempo.
- The PMO believed that technological obsolescence was the major driver of the estimated useful life.
- The program had no specific maintenance schedule. When the "reset" program began, the work was to occur at a unit level. Assets would only come back to the depot if there was a certain level of damage. However, this was not happening. Every asset returning from theater goes through "reset" at the depot.
- The PMO estimated that their assets were operating at 3 – 5 times the normal rate under combat conditions. This increased the cost of unscheduled maintenance and usage-based maintenance.
- Deferred maintenance was a significant issue for ground vehicles, more so than for aircraft, because "safety of flight" rules prohibit deferring most aircraft maintenance. For ground vehicles, units only repaired visible damage or didn't fix everything because of mission requirements. The program experienced unusual and unexpected wear inside the hull when assets came in for "reset" due to extended mileage, sand damage, environmental conditions, and road conditions (on vs. off). "Reset" entailed a 100% tear-down and inspection of the suspension to identify and address those unusual issues.
- The PMO believed that increased O&M and depot-level funding addressed the increased wear and tear on the assets, but maintenance would not bring the asset to a "zero-miles" condition. Increased operational tempo required replacement of expendable parts more frequently, but they were repairing and replacing. Assets were not scrapped because there was no replacement for the Abrams at the time of this study.
- The program was designed to avoid the necessity of bringing assets in for overhaul at set timelines, and this was the primary factor that led to a modular design for the tank. The program used Combat Vehicle Evaluation (CVE) to determine if a serious overhaul was necessary when serious structural damage occurred. The plan was for five per year, but the program generally did not reach that number.

- There were very few combat losses (nine to date). As long as the hull and turret were sound, the asset was repaired or reconfigured instead of being scrapped. The hull and turret were designed to survive for the entire life span of the asset, barring any major structural damage.

Regression Results

Since data on usage was provided for both Contingency Operations (ConOps) and non-ConOps, we used the non-ConOps data points for FY99 – FY01 (prior to assets being used in combat operations) and used the ConOps data points for FY02 – FY05 (assets deployed to combat operations). We were also able to analyze the M1A1 and M1A2 independently as we had data for both tank variants.

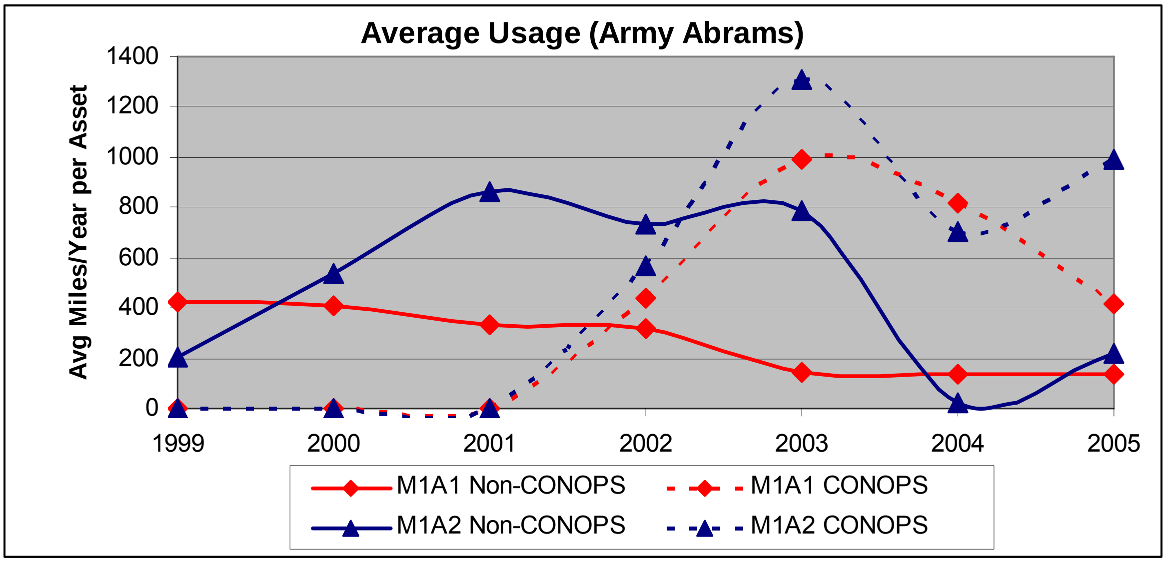
For the M1A1, the regression yielded inconclusive results, and the factors that aligned best with usage through the regression analysis (usage, mission capable rate, total number of assets, and weight) were not representative of those having a large impact on the assets per the PMO staff (accelerated technology cycles and replacement planning). As a result, we cannot recommend an accelerated depreciation for this program based on the data available at the PMO level. We recommend further exploration of the factors effecting estimated useful life at the depot-level as suggested by the PMO staff.

For the M1A2, the regression yielded conclusive results, and the factors that aligned best with usage through the regression analysis were those that were identified during the PMO site visit and documented in the questionnaire completed by the program as factors that would have an effect on the estimated useful life. These factors were usage, total number of assets, total number of assets in theater, and total number of non-combat losses. Technological obsolescence was identified by the PMO as one of the major factors that effect useful life; however, no data was available to quantify this factor. Therefore, we concluded that as usage changes the useful life for the program should follow.

Acceleration Recommendation

Additional analysis was performed on the M1A1 data to determine a preliminary acceleration factor based on usage only as a result of the increase in operational tempo. This was done because usage data by fiscal year was readily available. To determine this preliminary acceleration factor, we calculated the average peacetime usage (FY99-FY01) and average combat usage (FY02-FY05). The average peacetime usage was then compared to the total usage (peacetime plus combat) for the years that the program was subject to increased operational tempo (FY02-FY05) to determine the percentage increase. The result is a preliminary acceleration factor of 44.1%.

The following chart shows the average usage per year from FY99 through FY05. FY06 usage data was not available. The program began to experience increased operational tempo in FY02 due to combat and contingency operations. Based on this data we recommend that the program accelerate depreciation based on the percentage increase in usage (hours) each year. For example, in FY05 the average non-ConOps usage was 992 miles, which was a 344.84% increase over the average ConOps usage. If this usage trend continues, the M1A2 program will experience a loss of approximately fourteen years of service life for those assets subject to increased operational tempo.



6.5 USMC Abrams (Tracked Vehicle)

Program Description

The M1A1 Main Battle Tank is a full-tracked, low-profile, armored vehicle with a 120mm main gun and crew of four. It provides combat power to USMC units in the amphibious assault and subsequent operations ashore using maneuver, armor protected fire power, and shock to disrupt, disorganize, and destroy the enemy, his command and control, communications, and logistics.

Key Findings

- The initial estimated useful life was provided by the Army Tank-Automotive and Armaments Command (TACOM).
- All USMC Abrams tanks were maintained as a common configuration.
- Every six months, seventeen "fresh" tanks were rotated into Iraq, and seventeen tanks that had been in Iraq are rotated out. Thirty-four tanks were in theater at a time.
- Combat losses were replenished with Army spares since the program is no longer procuring new assets. The fleet was maintained at a level of 403 assets. There was no projected replacement for the Abrams tank.
- Mileage, hours, and the number of shots fired by the main gun were the significant criteria monitored to determine when an asset needed to return to the depot for "rebuild".
- USMC tank battalions, unlike Army tanks, float around the world for three years, with one tank battalion rotating home each year.
- Field-level maintenance was not scheduled based on usage, but instead based on calendar time. The cycle was semi-annual or annual.

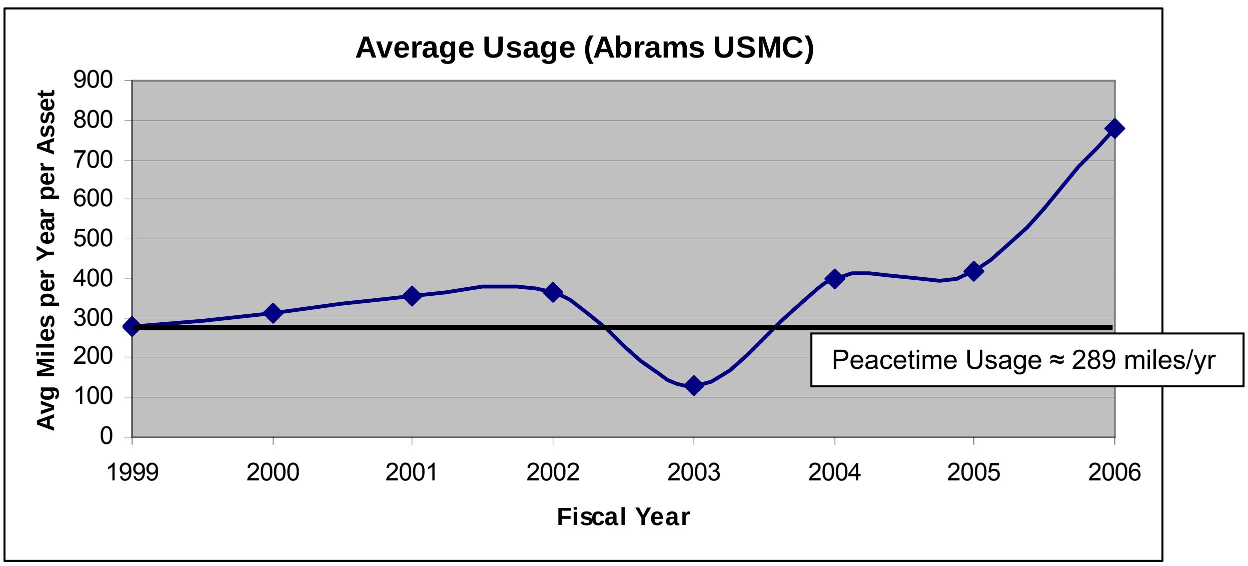
Regression Results

Since data on usage was provided for assets being used in CONUS and in OIF, we used the CONUS data points for FY99 – FY02 (prior to assets being used in combat operations) and the OIF data points for FY03 – FY06 (assets deployed to combat operations).

The regression yielded conclusive results, and the factors that aligned best with usage through the regression analysis were those that were identified during the PMO site visit and documented in the questionnaire completed by the program as factors that would have an effect on the estimated useful life. These factors were the usage, mission capable rate, combat loss, and total O&M funding. Therefore, we conclude that as usage changes the useful life for the program should follow.

Acceleration Recommendation

The following chart shows the average usage per year from FY99 through FY06. The program began experiencing increased operational tempo in FY04 due to combat and contingency operations. Based on this data we recommend that the program accelerate depreciation based on the percentage increase in usage (hours) each year. For example, in FY05 the average usage was 416.31 miles, which is a 44.31% increase over the average pre-combat (FY99-FY03) usage. If this usage trend continues, the program will experience a loss of approximately nine years of service life for those assets subject to increased operational tempo.



6.6 SOCOM MH-47 (Rotary Wing Aircraft)

Program Description

The MH-47 is a long-distance, heavy-lift helicopter equipped with aerial refueling capability, a fast-rope rappelling system, and other upgrades or operations-specific equipment. It conducts overt and covert infiltrations, exfiltrations, air assault, resupply, and sling operations over a wide range of environmental conditions. The aircraft can perform a variety of other missions including shipboard operations, platform operations, urban operations, water operations, parachute operations, forward aerial refueling point (FARP) operations, mass casualty, and combat search and rescue operations. With the use of special mission equipment and night vision devices, the air crew can operate in hostile mission environments over all types of terrain at low altitudes during periods of low visibility and low ambient lighting conditions with pinpoint navigation accuracy.

Key Findings

- An estimated useful life of twenty years was provided by Boeing for the Service Life Extension Program (SLEP), however based on historical experience, the PMO used an estimate of ten years (50% decrease) due to increased operational weight and harsh operating environment in which the assets routinely operated.
- The MH-47 carried an average of 4,000 pounds of mission equipment more than the Army CH-47, with the max gross weight being 54,000 pounds.
- Increased mission equipment and harsh operating conditions dictated the maintenance cycle for major items every 8 to 10 years.
- The fatigue life of the aircraft was driven by flying hours and the amount of strain on the airframe due to mission specific configurations.
- All disposals were due to combat loss. Aircraft were not washed-out for maintenance reasons. However, MH-47D models were removed from inventory and 18 remaining MH-47E models will be removed from the inventory for conversion to the MH-47G model. These changes were reflected in CAMS-ME.
- Based on mission specific needs, only a portion of the MH-47 fleet rotated through combat and contingency operations. These assets were using up their estimated useful life faster than the assets that were used in training environments.

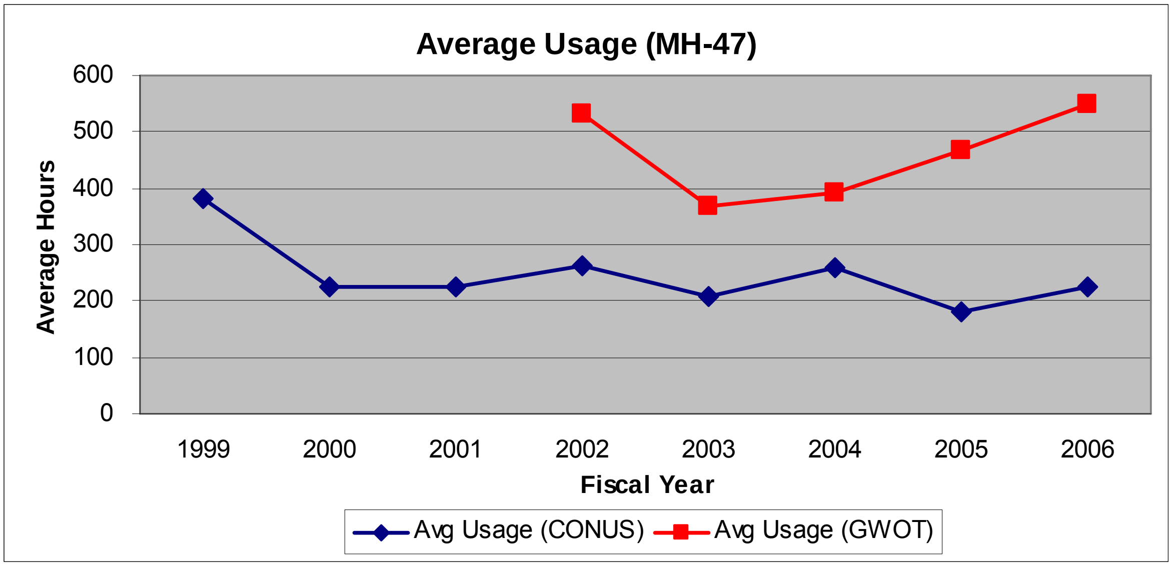
Regression Results

Since data on usage was provided for both assets used in GWOT and in the continental United States (CONUS), we used the CONUS data points for FY99 – FY01 (prior to assets being used in combat operations) and used the GWOT data points for FY02 – FY06 (assets deployed to combat operations).

The regression yielded conclusive results, but the factors that aligned best with usage through the regression analysis (total assets, total assets in combat, and combat losses) were not representative of those having a large impact on the assets per the PMO staff (increased load and combat losses). This was likely due to the fact that the PMO had already taken increased operational tempo as well as other factors into account when calculating the estimated useful life being used in CAMS-ME.

Acceleration Recommendation

We do not believe any adjustment should be made to the MH-47 program based on meetings with the PMO and the subsequent regression analysis.



6.7 SOCOM GMV (Wheeled Vehicle)

Program Description

The Family of Ground Mobility Systems (SOCOM HMMWV) allows SOF units and operators to move operationally and tactically on ground to acquire, report, and engage potential forces as required.

Key Findings

- The GMV program office was initiated at SOCOM in FY03, so data was only available from FY03 forward.
- The initial estimated useful life was based on the Army estimate of fifteen years. However, this estimate was revisited and adjusted to five years (67% decrease) in FY06 because program assets were undergoing a reset due to combat and contingency operations every two to three years. This change reflected the effects of operational tempo for SOF operations and missions to include load, terrain, and usage.
- Maintenance cycles increased as a result of combat and contingency operations, and depot-level maintenance was often more intensive because some field-level maintenance was being deferred until the asset reached the depot.
- Assets were reset to a "like new" status through depot-level maintenance, however this did not return them to a "zero-mile" status.
- The weight of payload and weapons were factors considered in the update of the useful life in FY06.
- The GMV PMO does not track asset usage by miles.

Regression Results

Since the program only began in FY03, there was limited data available for the program. As a result, the regression yielded inconclusive results. The factors used in the regression were combat loss, total O&M funding, and field-level O&M funding.

Acceleration Recommendation

Like the MH-47, this is a SOCOM program. The program office has already taken increased operational tempo as well as other factors into account when calculating the estimated useful life currently being used in CAMS-ME. As a result, we do not believe any adjustment should be made to the GMV program based on meetings with the PMO and the subsequent regression analysis.

6.8 Army HMMWV (Wheeled Vehicle)

Program Description

The M1114 is fitted with a passive up-armoring package developed by the O'Gara-Hess & Eisenhardt Armoring Company. Over 16,000 M1114's have been fielded worldwide. The up-armoring package provides the occupants with protection from 7.62mm armor piercing attack through a full 360º, 155mm artillery bursting overhead and under body blast. The M1114 can be fitted with a wide range of weapon systems on the roof, including 7.62mm or 12.7mm machine guns or a 40mm automatic grenade launcher. Standard equipment on the M1114 includes automatic transmission, power steering, and a heavy duty air conditioning system. The HMMWV vehicles currently in production are the M1151 & M1152.

Key Findings

- The original estimated useful life was based on an engineering estimate. The source was a FY99 Analysis of Alternatives (AoA), but there was no documentation at the time of our site visit to establish the estimated useful life due to the age of the document. The PMO was in the process of reviewing sample data from OIF and CONUS to address the immediate issues from theater.
- Only a portion of the fleet (approximately 25,000 out of 140,000 assets) faced increased operational tempo due to combat and contingency operations. Assets involved in these operations were different variants than those operating in peacetime conditions. As a result, the PMO believed that each variant should have an independent estimated useful life.
- Through sample data collection (SDC), the program determined that combat operational tempo is 25-50% higher than peacetime. Maintenance was done in wartime to counter the effects of increased operational tempo, to some degree, but regardless of the maintenance or "reset" completed, it did not bring the vehicle to a true "zero-mile" condition.
- There was also no standard depot-level maintenance schedule, only rebuild and recapitalization programs. Tactical vehicles do not traditionally require or utilize the depot level for maintenance, as maintenance occurs at lower echelons. Prior to

the war, there were no recapitalization or reset programs. Reset was set up to repair trucks that came back from combat operations specifically. The need to do recap/reset is driven by the condition of the fleet. Many of the vehicles were built in the 1980's and were past their useful life at the time of this study, driving the need for either reset, recap, or an increase in new procurement. Higher usage and deferred maintenance were among the factors that created the need for these efforts. Vehicles are reset as long as the frame is still structurally sound.

Regression Results

The regression yielded inconclusive results, and the factors that aligned best with usage through the regression analysis (total assets, total losses, and weight) were not representative of those having a large impact on the assets per the PMO staff (increased load and operating conditions).

Acceleration Recommendation

We cannot recommend an accelerated depreciation for this program based on the data available at the PMO level. We recommend further analysis as suggested by the PMO staff to identify the factors effecting estimated useful life.

6.9 USMC HMMWV (Wheeled Vehicle)

Program Description

The aging USMC fleet of HMMWV purchased in the 1980's have been or will be replaced with HMMWV A2 series and Expanded Capability Vehicle (ECV) HMMWV series vehicles. The A2 and ECV series improve safety, reliability, availability, maintainability, durability, and provide a variety of wheeled platforms: cargo/troop carrier, armament carrier, Tube-Launched, Optically-Tracked, Wire-Guided (TOW) missile carrier, shelter carrier, and two ambulance variants (one carrying two litters and one carrying four litters). Major improvements include: 15-year corrosion prevention, upgraded braking system, 3-point seat belts, 6.5 liter EPA certified diesel engine, electronically controlled transmission, and a new engine electrical start system.

Key Findings

- The initial estimated useful life was provided by the Army Tank-Automotive and Armaments Command (TACOM).
- Supplemental funding was provided to the maintenance facilities at the field and depot level directly from the Logistics Command (LOGCOM), not the program office. Funding for the procurement of new vehicles was provided through the program office.
- Prior to OIF, there was no reset maintenance program. A new reset maintenance program, Initial Repair Only as Necessary (IROAN), began in FY07. Not all assets returning from OIF were scheduled to through the IROAN program (less than 300 per year will likely go through).

- There was no standard maintenance timeline beyond the preventative maintenance procedures for the HMMWV program. Assets were brought in for intermediate level maintenance as they broke down. All routine maintenance was handled at the field level.
- The Marine Armor Kit (MAK) was produced at Albany Depot then shipped and installed on all vehicles in the Western Province of Iraq. Once initial conversion was complete, a follow-on effort installed the kits in CONUS prior to those new vehicles going over to Iraq. As of January 2007, 3,100 kits were installed directly supporting OIF and another 2,400 had been authorized for use with Marine Expeditionary Units or held as spares for OIF.
- HMMWV was designed to run, so increased usage (mileage) is not a major factor in the estimated useful life. The environment is a bigger factor, and the most important factor is the armor that causes the asset to exceed its operating weight.

Regression Results

The regression yielded inconclusive results because usage and quantity data were not available. The available factors modeled well together, but we cannot make any recommendations without usage and/or quantity data. The factors used in the regression were mission capable rate, time between depot maintenance, depot cycle time, and cost per depot action.

Acceleration Recommendation

We cannot recommend an accelerated depreciation for this program based on the data available at the PMO level. We recommend further analysis to identify the factors effecting estimated useful life as suggested by the PMO staff.

7 Task 4: Recommendations for Implementation

Based on the sample programs, we found that the consistent dependent variable for aircraft is usage, flying hours or fatigue hours. The independent variables vary by program based on the available data. As a result, we suggest that the estimated useful life for aircraft be measured in terms of usage as opposed to years. However, if this is not possible due to system constraints, we suggest that the useful life in years for aircraft programs be calculated using the following simple equation:

$$\text{Estimated Useful Life (in years)} = \frac{\text{Estimated Useful Life (in Hours)}}{\text{Average Hours per Year (in peacetime)}}$$

This can be calculated for each year that the program experienced increased operational tempo, with the only difference being that the denominator would be the average hours per aircraft for that given year. The percentage change between the peacetime rate and the calculated rate would be the acceleration factor. We recommend that this analysis be conducted for all aircraft involved in current combat and contingency operations, and the accelerated depreciation be reported on the financial statements. This will result in more accurate data for use in the budget process and by high-level decision makers.

For ground vehicles, usage is the most consistent dependent variable, but it is not as useful as it is for aircraft for two reasons. First, usage does not drive the useful life of a ground vehicle as much as it does for aircraft. Second, there is less data readily available on this factor. As a result, and at the suggestion of the program offices, we recommend looking into the operations of the depot maintenance facilities. For ground vehicles, most decisions on what should be repaired and what should be disposed are made by the staff at the depot facilities. Though most of these decisions are likely subjective, there seems to be a standard process, at least within each program, to make these determinations. A more in-depth look into these processes could help determine if other factors need to be analyzed to better calculate an accelerated depreciation for ground vehicles. In the interim, the ground vehicle programs, such as the Army Abrams (M1A2) and USMC Abrams, which yielded conclusive results, can be accelerated using the formula above. However, the others do not show any conclusive results through the regression analysis that would warrant accelerated depreciation based on the data provided by the PMO.

For programs where there is a change in estimated useful life due to combat and contingency operations of more than five percent, two depreciation schedules should be used. One using the standard estimated useful life for assets not subject to combat and contingency operations during the year and the other using an accelerated estimated useful life for assets in used combat and contingency operations during the year. Programs that do not show the need for accelerated depreciation will continue to use the standard useful life as reported in CAMS-ME. The same approach can be taken for program modifications if they are subject to the same stress and increased usage due to combat and contingency operations.

At a higher level, we recommend that this study be extended to the next phase and expand to examine all ME programs experiencing increased operational tempo as a result of current combat and contingency operations (estimated at 50 to 100 programs). This much larger population will allow for regression analysis using the estimated useful life as the dependent variable and the other factors that we have been using in this study as the independent variables. One analysis would be conducted with data prior to increased operational tempo and the other post. This increased sample would be more likely to yield a resulting equation(s) that could be used to model future estimated useful life projections across asset classes or across the DoD inventory. The increased sample eliminates the need for a middle step in determining the acceleration factor. With our current sample we need to relate our regression results to another factor (usage) to determine an acceleration factor. Instead, the difference between the two regression results, increased tempo versus regular tempo, would be the acceleration factor. Again, even the success of this expanded effort would rely heavily upon availability and detail of data from the programs.

8 Task 5: Implementation Recommendation of Results into the PPBE Process

The final task of this study was to provide recommendations for inclusion of the accelerated depreciation methodology into the Program, Planning, Budgeting, and Execution (PPBE) process. To accomplish this task, we conducted meetings with the Office of the Secretary of Defense (Program Analysis and Evaluation) (OSD(PA&E)) and Program Budget (PB) to brief the findings of our site work and discuss the budgeting process in detail. Based on the discussions with OSD(PA&E) and PB, the DoD should consider adding guidance for including depreciation schedules and supporting narratives regarding operational tempo in the Program Objectives Memorandum (POM), planning guidance, and Budget Exhibits (i.e., P-40, OP-5, and OP-30). This additional information can be used to assist the PMOs in formulating their annual maintenance and procurement funding requests. We recommend completing a "pilot program" to demonstrate the approach for adding depreciation schedules into POM, planning guidance, and Budget Exhibits.

9 Conclusions

Through the first three tasks of this study, we recommended a revised definition of depreciation, suggested a methodology for the application of the definition, and conducted field visits with nine sample programs to test and validate the methodology. Based on the results of these tasks, we determined that several steps remain to determine the overall impact of increased operational tempo on ME assets. These steps include determining the number of ME programs subject to increased operational tempo, establishing implementable policies and procedures that account for program specific elements and mission profile changes, and the development of a tool to assist program managers with the estimated useful life calculation.

Specific to the results of the study, it appears that the estimated useful life for aircraft can be accelerated for times of increased operational tempo using flying/fatigue hours as the dependent variable. This adjusted estimated useful life can then be used to determine the accelerated depreciation expense by year and resulting net book value by program. This will provide more accurate, decision quality information to assist program managers and business analysts with preparing improved depreciation schedule projections and developing maintenance and/or replacement plans based on revised schedules. For ground vehicles, additional work should be done at the depot-level to assist with determining quantifiable factors that can be included in the methodology to account for the effects of combat and contingency operations on the estimated useful life and depreciation schedules for these programs.