USAF Service Life Extension Process

26 Jun 2018

Aging Surveillance Test Program

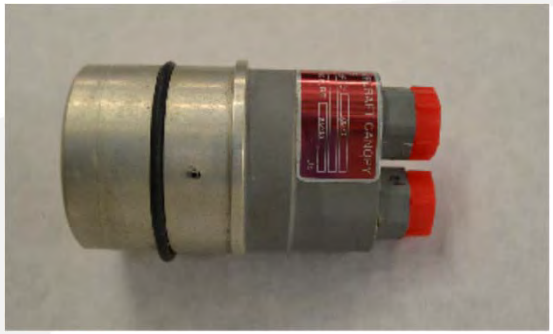
- AFI 63-101, *Integrated Life Cycle Management*
- AFMCI 63-1201, *Implementing Operational Safety Suitability and Effectiveness (OSS&E) and Life Cycle Systems Engineering (LCSE*)
- CAD/PAD Sub-System System Engineering Plan (SEP)
- Indian Head Explosive Ordnance Disposal Technology Division (IHEODTD) is the responsible test organization for the USAF/Navy Joint Program Office (JPO)
  - Joint testing is accomplished for common items for synergy
    (T-6 Texan, V-22 Osprey, Fire Extinguisher Cartridges, Cable Cutters, etc.)
  - Tests conducted at Hill AFB (HAFB), IHEODTD, or by original supplier
  - Testing conducted in same manner as Lot Acceptance Testing (LAT)
- Items typically tested on 3-year cycle with ~60 tests/year
- Selected test samples are items removed from fleet due to expired shelf and/or service life limits
- Test results analyzed to validate appropriate shelf/service life (published in Technical Order (T.O.)) and determine available buffer to support temporary life extensions for deployments, maintenance consolidation, delinquent contract deliveries, etc.
- Two types of reliability attributes assessed
  - Catastrophic: ability of device to provide output (dudding)
  - Performance: ability to meet specified output requirements

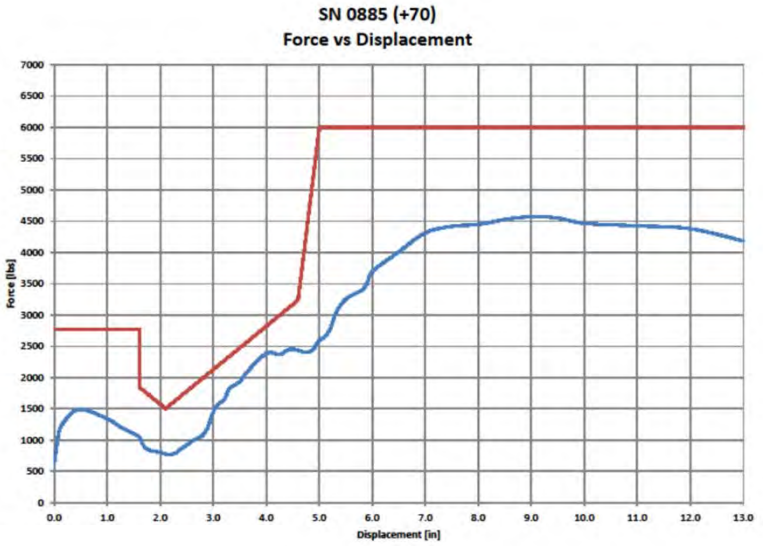
Aging Surveillance Test Program

- Performance trends analyzed against Lot Acceptance Tests (LAT)
  - Standard Deviation of sample populations at 95% confidence level evaluated against max and min performance limits
- Dissections and chemical analysis used on case by case basis to augment item functional performance testing
  - Assessment of energetic materials physical/chemical integrity
    - Residual % of propellant stabilizer for Nitrate Ester explosives
    - Grain structural integrity; cracks/chipping etc.
    - Degradation products of chemical reactions
    - Compatibility of mixtures
    - Propellant stress, strain, hardness
    - Propellant to liner bonding strength
  - Mechanistic aging recently employed for longer aging predictions
    - U-2 Rocket Catapult (underway)
    - F-15 Canopy Remover Cartridge

Aging Surveillance Test Program

- F-15 Canopy Remover Cartridge – Traditional Surveillance Test Program
  - Completed June 2017
  - Cartridges functioned on the LAT fixture using service returned and new canopy removers
  - Tested a total of 15 dual seat cartridges
    - Lot Numbers: 03K, 04C, 04L, 06K
    - Ages ranged from 11 to 14 years old at time of test
  - All cartridges functioned as designed and met specification requirements





Aging Surveillance Test Program

- F-15 Canopy Remover Cartridge – Mechanistic Aging and Surveillance Testing
  - Analysis of physical and chemical properties
    - Completed Aug 2017
    - Dissected and tested a total of 12 (6ea single seat, 6ea dual seat) cartridges
      - Two (2) lot numbers per cartridge type: 01E, 06A (single seat); 03K, 06K (dual seat)
      - Three (3) cartridges from each lot
      - Ages ranged from 11 to 16 years old on the single seat version; 11 to 14 years old on the dual seat version
  - Testing/Inspection Results
    - All samples passed leak tests, visual inspection, and x-ray inspection
    - O-ring analysis
      - Any compression set of O-rings does not affect performance
      - Some O-ring damage and an incorrectly sized O-ring found in cartridge housing (not age related)
      - The O-ring damage and incorrect O-ring size found would not affect cartridge performance
    - Primer testing: one set of primers from each lot (all functioned without issue)
    - Black powder testing: no issues identified
    - Propellant testing: no significant aging trends observed

- Conclusion: The F-15 canopy remover cartridges are aging well and are being evaluated for a permanent life increase

USAF Service Life Extension Process

- Technical Order (T.O.) 00-20-1 Aerospace Equipment Maintenance Inspection Documentation, Policies, and Procedures

TO 00-20-1

6.2.4 Equipment in an operational status used for ground instructional purposes will have the TCIs replaced at the specified replacement interval. Compute operating time accrued on accessories installed on the equipment while in such status by multiplying the estimated monthly usage by the number of months that the equipment is in such status.

6.2.5 Consider TCIs due for replacement at the hourly post-flight, home station check, phased, periodic, minor or major isochronal, scheduled PDM, etc. nearest to the replacement date. Base the determination of the nearest inspection for calendar TCIs on the average or projected utilization of the aerospace equipment for any given period. As an example, if an aerospace vehicle having a 26-hour inspection cycle accrues an average of 25 hours each month and is undergoing an inspection on the first day of the month, any calendar TCIs due for change between the 1st and 15th of that month are due for change at that inspection. Similarly, any calendar TCIs due for change between the 16th and the last day of that month will be considered due for change at the next inspection.

6.2.5.1 MAJCOMs may waive the requirement to make time changes at hourly post-flight when the interval is 50 hours or less. This policy enhances effective maintenance scheduling, reduces equipment downtime, and eliminates the need for checking replacement documents on a daily basis.

6.2.5.2 The expiration date for both the service and shelf life on life sustaining or Cartridge Actuated Device/Propellant Actuated Device (CAD/PAD) items will be the last day of the expiration month. EXCEPTION: Service limits of life sustaining or CAD/PAD items cannot exceed the limits imposed by Tables 6-1 and 6-2. Units should schedule these items for replacement at the nearest scheduled inspection prior to expiration of service life established by the applicable series TOs.

NOTE

- Requests for new or existing CAD/PAD shelf/service life extensions will be submitted through the AMMO and Agile Munitions Support Tool (AMST)-Global Ammunition Control Point (GACP) website located in the Air Force Portal. Requests for access is required. Once in the website select the JPO CAD/PAD link, select Electronic Temporary Extension Management System (E-TEMP) System, and then select the applicable process you wish to request. After completing all required information select submit. The required engineering analysis will be accomplished by the applicable JPO CAD/PAD engineer and provided to the applicable system program office with recommendation to either extend or not extend the items as requested. The system program office will provide a list of personnel that extension requests can be forwarded to for approval to the JPO CAD/PAD office (784CBSG/GJ, Hill AFB). The designated personnel at the system program office will have final approval authority over the requested extension. For those who cannot gain access to the E-TEMP system contact Customer Service at DSN 775/777-2666 or commercial (801) 775/777-2666 for assistance.

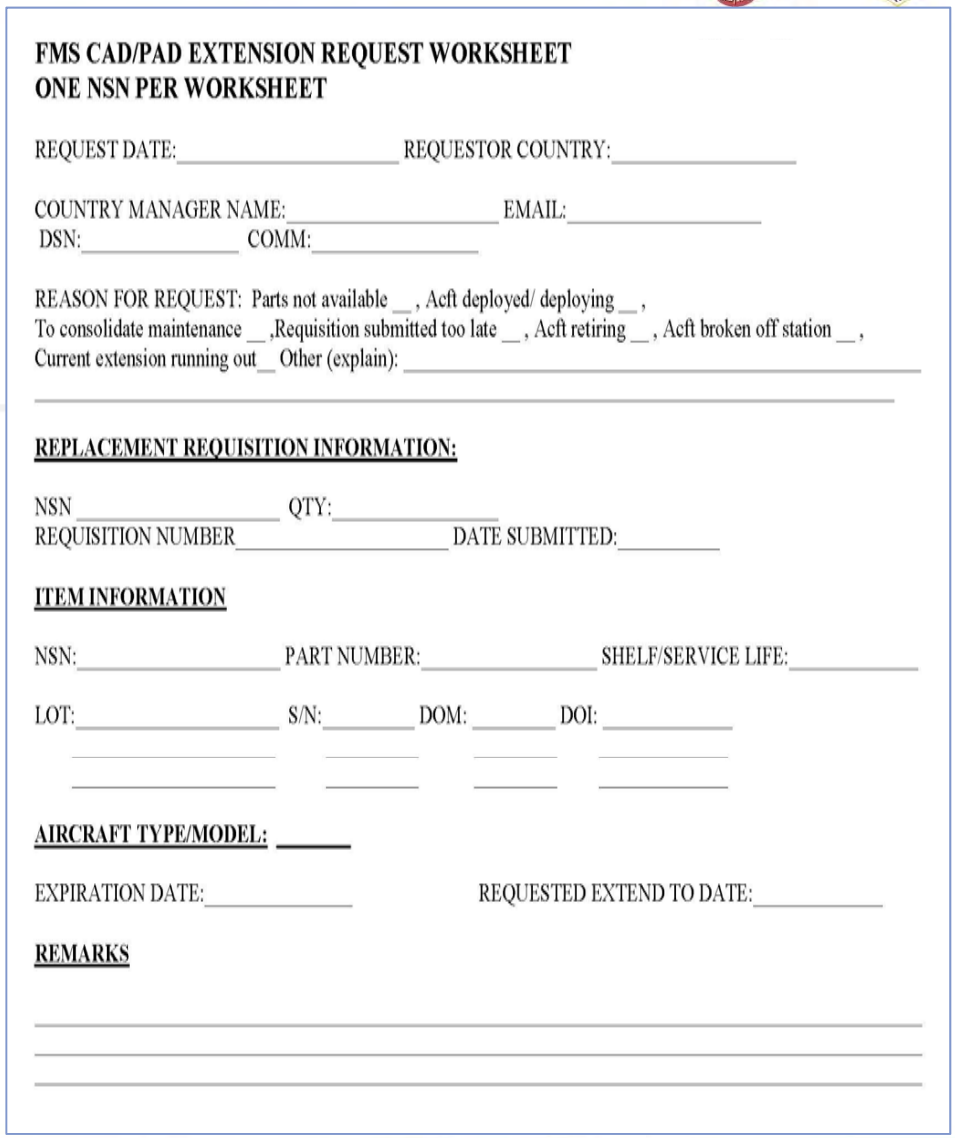
- Requests for AFE items shelf/service life extensions should be forwarded through appropriate MAJCOM focal point to the sustaining authority as identified in TO 14-1-1. The system engineer will consider shelf/service life extensions based upon item application and engineering technical analysis. The intent is to preclude unnecessary aerospace vehicle grounding.

Web-based system for CAD/PAD Shelf/Service Life Extension Requests

SPO Coordination and final approval authority for temporary life extension

USAF Service Life Extension Process

- Country submits extension request to:
  - — Country Case Manager (CCM)
  - — Foreign Liaison Officer (FLO)
  - — System Program Office (SPO)
  - — or directly to Country Line Manager
- CCM/FLO/SPO will forward to Country Line Manager at Hill AFB
- Submit requests NLT 60 days prior to expiration date
  - — Many competing requests – ***you are not the only customer***…
  - — Late requests risk grounding aircraft
  - — One request per NSN/PN and aircraft variant (i.e. F-16C; F-16D)
    - Include:
      - Serial #
      - Tail #
      - Date of Installation (DOI)
      - Requested extend-to date
      - Reason for request
      - Document Control Number (DCN(s))
    - Multiple lot numbers with multiple DOI's can be on same request



FMS CAD/PAD EXTENSION REQUEST WORKSHEET
ONE NSN PER WORKSHEET

REQUEST DATE:_____ REQUESTOR COUNTRY:_____

COUNTRY MANAGER NAME:_____ EMAIL:_____
DSN:_____ COMM:_____

REASON FOR REQUEST: Parts not available __ , Acft deployed/ deploying __ ,
To consolidate maintenance __ ,Requisition submitted too late __ , Acft retiring __ , Acft broken off station __ ,
Current extension running out__ Other (explain): _____

REPLACEMENT REQUISITION INFORMATION:

NSN _____ QTY:_____
REQUISITION NUMBER_____ DATE SUBMITTED:_____

ITEM INFORMATION

NSN:_____ PART NUMBER:_____ SHELF/SERVICE LIFE:_____

LOT:_____ S/N:_____ DOM:_____ DOI:_____

AIRCRAFT TYPE/MODEL: _____

EXPIRATION DATE:_____ REQUESTED EXTEND TO DATE:_____

REMARKS

USAF Service Life Extension Process

- Electronic Temporary Extension Program (E-TEMP)
  - — Initiated by Country Line Manager (AF Portal access)
    - Extension number format - 2018141007
      - ✓ 2018 year
      - ✓ 141 Julian day
      - ✓ 007 Serial number for the day
    - Submitter can query exact status while request is in review/approval process
- USAF will only recommend extension if:
  - ✓ USAF would extend life given a similar situation
  - ✓ Based on available performance data
- 5-level review process:
  - CAD/PAD Equipment Specialist
  - CAD/PAD Item Manager
  - CAD/PAD System Engineer
  - Aircraft System Program Office (SPO)
  - CAD/PAD Program Manager
- Engineering evaluation attached to extension recommendation for country to make final determination

DEPARTMENT OF THE AIR FORCE
AIR FORCE LIFE CYCLE MANAGEMENT CENTER
HILL AIR FORCE BASE UTAH

5/28/2018

MEMORANDUM FOR: AFLCMC/EBHMI (Country)

INFO: AFLCMC/WWMEY (Aircraft System Program Office)
AFLCMC/EBHJ (CAD/PAD JPO, Hill AFB)

FROM: AFLCMC/EBHJ

SUBJECT: Temporary Shelf/Service Life Extension for NSN 1377010739444, P/N 51062-8, Emergency Canopy Release Line, Lot Numbers OAC00F001-018 and OAC97A002-005

REF: (a) Your 5/21/2018 E-TEMP Request, E-TEMP Number: 2018141007
(b) AFLCMC/WWMEY E-TEMP Recommendation, dated 5/24/2018

1. Engineering evaluation conducted on subject components indicates that a temporary extension is warranted. If the USAF were faced with a similar situation, this office would recommend a temporary shelf/service life extension as follows:

LOT NO: OAC00F001-018	-	SER NO: 189	-	EXTEND TO: 6/30/2020
LOT NO: OAC00F001-018	-	SER NO: 194	-	EXTEND TO: 6/30/2020
LOT NO: OAC97A002-005	-	SER NO: 13087-32	-	EXTEND TO: 6/30/2020

2. The decision of whether or not to temporarily extend the life of the subject components and the magnitude of that extension must be made by (Country), not the USAF.

3. Your requisition XXXX9440857609 was processed for shipment 1 May 2018 on SIR# 950776. This extension will allow time for receipt and installation.

4. Please direct questions to CAD/PAD (Equipment Specialist), DSN: XXX-XXXX; CAD/PAD (Item Manager), DSN: XXX-XXXX; or CAD/PAD (E-TEMP Coordinator), DSN: XXX-XXXX.

5/28/2018

X
CAD/PAD Program Manager

USAF Hazard Risk Assessment (HRA)

- Initiated when Aging Surveillance testing identifies performance is not meeting or is not projected to meet specified performance limits (either high or low relative to parameter tested)
  - Initiated when limited test data is available for data analysis
  - Conducted in accordance with MIL-STD-882E
    - System Program Office input for system level evaluations
    - Risk Assessment Code (RAC) based on Probability/Severity
    - Appropriate level of Acceptance Authority required per RAC
  - Available mitigation strategies pursued when available
    - Cross-leveling between bases
    - Replacement-in-Kind (RIK) from USAF stock
    - RIK from other agencies (Navy, Army, NASA)
- Formal HRAs:
  - ACES II Harness Release Cartridge – Resolution Apr 2019
  - ACES II DRS Circuit Noise – Resolution Jan 2020
  - F-15 Canopy Remover Cartridge – Resolution Jul 2018
  - F-16 Thin Layer Explosive (TLX) Line – Resolution Jan 2019

QUESTIONS ?