U.S. ARMY COMBAT CAPABILITIES DEVELOPMENT COMMAND AVIATION & MISSILE CENTER

Parts Management Guidance

David Locker

Electronic Parts/Processes Technology

Manufacturing Science and Technology Division

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PARTS MANAGEMENT GUIDANCE TOPICS

- Policy and Standards
- Program Management Goals and Objectives
- Parts Management Program Structure
- Parts Management Plan Elements
- Program Phase and Pathway Considerations
- Concluding Remarks

PARTS MANAGEMENT POLICY AND STANDARDS

- **DODI 5000.88, Engineering of Defense Systems**
  - Parts Management, 3.6f, "The PM will ensure that a parts management process is used for the selection of parts during design to consider the life cycle application stresses, standardization, technology (e.g., new and ageing), reliability, maintainability, supportability, life cycle cost, and diminishing manufacturing sources and material shortages. As applicable, parts management requirements should be specified in the RFP's statement of work for the TMRR, EMD, and production acquisition phases."
- **MIL-STD-3018, Parts Management**
  - Requires Plan to address parts reliability, quality, availability, and standardization
  - Supported by SD-19, Parts Management Guide
- **MIL-STD-11991, General Standard for Parts, Materials, and Processes**
  - Detailed requirements and guidance
- **MIL-STD-1546, MIL-STD-1547 (Space and Launch Vehicles)**
  - Parts, Materials, and Processes Engineering, Management and Control
- **Defense Acquisition Guidebook, Chapter 3, Systems Engineering**
  - 4.3.19 (Reliability and Maintainability) and 4.3.21 (Standardization)
- **Industry Standards**
  - SAE EIA-STD-4899, Electronic Component Management Plan
  - IEC TS 62239, Electronic Component Management Plan
  - AIAA R-100, Recommended Practice for Parts Management

SAE: Society of Automotive Engineers
IEC: International Electrotechnical Commission
AIAA: American Institute of Aeronautics and Astronautics

INDUSTRY STANDARDS FOR PARTS, MATERIALS, AND PROCESSES (PM&P)

Standard	Topic
SAE EIA-STD-4899	Component Management
SAE AS5553, SAE AS6174	Counterfeit Prevention
SAE AS12500	Corrosion Prevention
SAE EIA-933	Commercial Off-the-Shelf Mgt
SAE GEIA-STD-0005-1	Pb-free Control Management
SAE GEIA-STD-0005-2	Tin Whisker Risk Management
SAE AS8030	Electronics Materials & Processes
IPC J-STD-001	Electronic Assembly
IPC-A-620	Cable and Wire Harnesses
SAE AMS7000 series	Additive Manufacturing

Industry Standards available to address most detail requirements

PM&P INDUSTRY STANDARDS BODIES

- SAE International (Society of Automotive Engineers), Individuals
  - Avionics Process Mgt Committee (Parts Mgt, EIA-STD-4899)
  - CE-12 (Solid State Devices) and CE-11 (Passive Devices)
  - G-19 (Counterfeit Risk Mgt Plan: SAE AS5553)
  - G-24 (Pb-free Electronics Standards)
  - G-25 (Corrosion Prevention)
- International Electrotechnical Commission, Countries
- IPC, Organizations
  - Electronics assembly standards: e.g., J-STD-001
  - Pb-free Electronics Risk Management (PERM) Council
- JEDEC (JC-14 and JC-13): Semiconductor device quality and reliability, Organizations
- Automotive Electronics Council, Organizations
  - Electronic parts qualification requirements: AEC Q100, Q101, Q200
- ASTM International (formerly, American Society for Testing and Materials), Individuals and Organizations
- Aerospace Vehicles Systems Institute (Texas A&M) consortium, Organizations

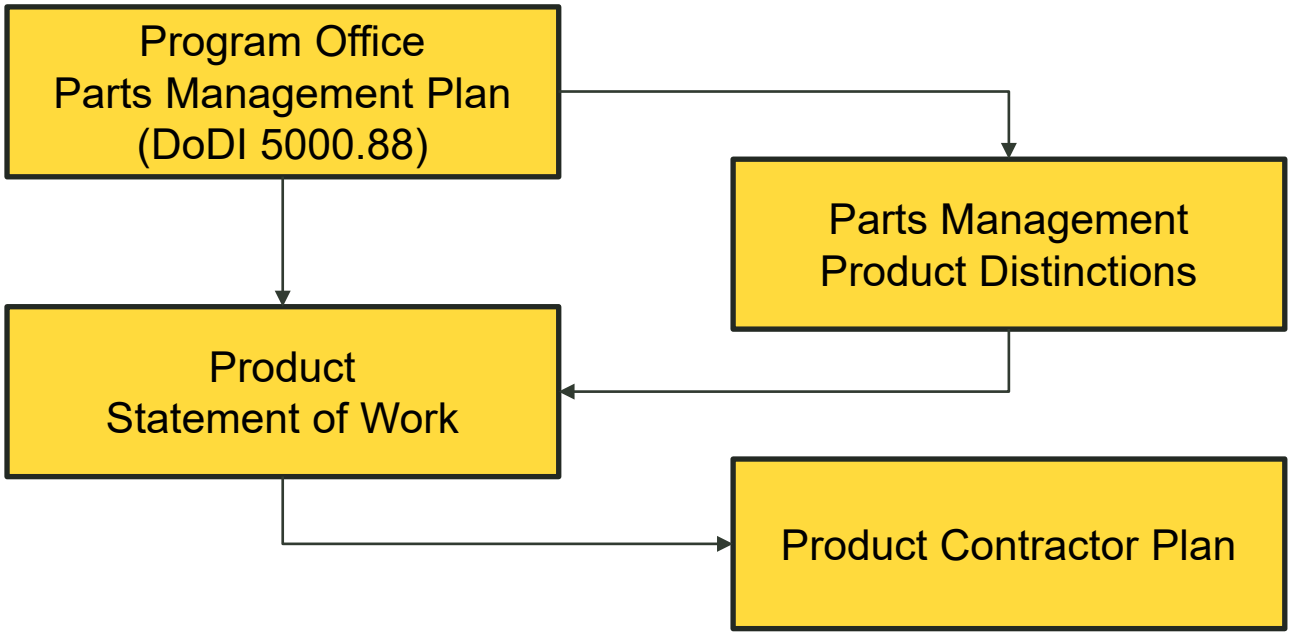
PM&P: Parts, Materials, and Processes

PARTS MANAGEMENT OBJECTIVES

- **Institute Parts Management Program that optimizes performance and life cycle cost**
  - DoDI 5000.88 part selection considerations
  - Life cycle application stresses, standardization, technology, reliability, maintainability, supportability, life cycle cost, and diminishing manufacturing sources and material shortages
- **MIL-STD-3018 Objectives include**
  - Standardization to limit parts proliferation
  - Meeting system reliability and performance
  - Definition of parts selection criteria and qualification
    - Limit need for additional testing and analysis
  - Managing obsolescence
- **Leverage practices in place in Industry**
  - SAE EIA-STD-4899 used throughout commercial aviation supply chain
  - Require only modest tailoring for particular products

PARTS MANAGEMENT PROGRAM STRUCTURE

- **Program Parts Management "Process" Required by DODI 5000.88**
  - Document the Process: e.g., Program Policy, Standard Operating Procedure, etc.
  - Define when to require contractor Plans
  - Statement of Work requirements: establish boilerplate starting point
  - Define System Specification standard performance requirements
- **Define requirements for Program products**
  - Establish baseline requirements for different "classes" of products
    - Examples: "benign" vs "harsh" environments, long vs short service life, maintainable vs not maintained
  - Elements within products may have different requirement "classes"
- **Develop Criteria to assess contractor Plans based on requirements**



PARTS MANAGEMENT CONTRACT REQUIREMENT GOALS

- Utilize Industry Standards (and Military Standards)
  - Used in Defense and Non-Defense Applications
  - Aids leveraging commercial applications with similar requirements
  - Address NDAA 2017 Section 875
- Provide Assurance of Disciplined Parts Management
  - Documented Selection and Qualification Processes
  - Government Insight into Parts Selection and Qualification
- Document Parts Used in Qualification and Production
  - Establish and Maintain Qualified Baseline
- Apply Lessons Learned to Assure Meeting System Requirements

Effective Parts Management Required to Maintain and Improve Readiness

NDAA 2017: National Defense Authorization Act for Fiscal Year 2017, Public Law 114-328

PARTS MANAGEMENT PLAN ELEMENTS

- **Government-Contractor interface and relationship for Parts Management**
  - Insight and/or oversight: how and what type of data
  - Government formal review of part selection and qualification?
- **Flow down of requirements to lower tier suppliers**
- **Define restricted use Parts: known issues in similar applications**
  - MIL-STD-11991 includes Problem Parts, Materials, and Processes list
- **Part selection order of preference**
  - Prioritize part classes that innately meet program requirements
  - Consider quality and reliability level, obsolescence timeline, etc.
- **Derating: need to at least assure no over-stressing**
  - MIL-STD-11991 includes criteria consistent with most in use across industry
- **Part qualification methodology**
  - Test assets must be planned and identified
- **Address risk of parts in Commercial Off-the-Shelf (COTS) assemblies**
  - SAE EIA-933, COTS Management Plan
- **Risk Management topics**
  - Obsolescence, Counterfeits, Lead-free electronics, Additive Manufacturing, etc.
- **Existing Standards identify needed elements**
  - MIL-STD-3018, MIL-STD-11991, EIA-STD-4899, IEC TS 62349
  - Product specific concerns may require other elements

PROGRAM PHASE CONSIDERATIONS

- **Acquisition Pathways**
  - Traditional and Rapid Middle Tier both need Parts Management
  - Tight timeline makes efficient, effective Parts Management more critical
- **Preliminary Design Review**
  - Important to have Parts Management discipline in place
  - Selection of key parts have long-lasting program impacts
  - Initial planning to address any part capability knowledge gaps
    - Functional performance, reliability, manufacturing use, etc.
    - Identify test and analysis assets required
- **Critical Design Review**
  - Document qualification methodology for all parts
    - Detailed plans for any additional test and analysis
    - Assure reliability and quality
  - Verify derating, no restricted parts without valid risk mitigation, availability, etc.
  - Address manufacturing risks (Incorporating part into assembly and system)
- **Production**
  - Monitor risks: obsolescence, part change notices, lot variations

CONCLUSIONS

- **DoD policy requires Parts Management "process"**
  - Best documented in Government approved Plan required by contract
- **Many resources exist to define and develop the Process**
  - Military and Industry Standards
  - General methodology already used through most of Military supply chain
- **Opportunities to engage in documenting and learning best practices**
  - DoD Parts and Materiel Management Working Group
  - SAE
  - IEC
  - Detailed product and process standards bodies
    - SAE, IEC, IPC, JEDEC, American Society for Testing and Materials, and more