SD-19

Parts Management Guide

DEFENSE STANDARDIZATION PROGRAM OFFICE

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Contents

Foreword

Today's defense acquisition environment is characterized by rapidly changing designs and technologies and by increased risks in weapon system performance and support due to issues with parts. In this environment, the need for defense contractors to have an effective parts management program is greater than ever before. This publication provides government and industry managers a pragmatic approach toward parts management to enhance weapons systems operational and logistics readiness and to reduce the logistics footprint and total ownership cost. The guidance in this document, when used in conjunction with MIL-STD-3018, "Parts Management," will help ensure successful parts management to support current acquisition strategy. It may also be used as a tool for evaluating a contractor's parts management performance.

This document is intended to be used by defense contractors and acquisition activities. In particular, this document offers guidance to individuals who are defining parts management requirements in contracts; establishing a parts management process for prime contractors, subcontractors, and suppliers; and looking for an efficient and manageable part selection process. Parts management contributes to the overall systems engineering mission in the risk identification and management and the life-cycle focus areas. Additional guidance can be found in the *Defense Acquisition Guidebook* at https://dag.dau.mil/, Section 4.3.18.21, Standardization.

Today's parts management program is becoming more flexible, more user friendly for contractors, and more comprehensive due to a major reengineering effort that is still underway. We are extremely grateful to the numerous government and industry individuals on the Parts Standardization and Management Committee (PSMC) who contributed to this effort. Further information on this group can be found on the PSMC website at http://www.landandmaritime.dla.mil/programs/psmc/.

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CHAPTER 1

PARTS MANAGEMENT CONTRIBUTIONS TO AFFORDABLE SYSTEM OPERATIONAL EFFECTIVENESS

Parts Management Overview

In today's acquisition environment—characterized by rapidly changing designs and by increased risk for Department of Defense (DoD) weapons systems and equipment acquisition contracts due to an increased emphasis on the use of commercial part types, offshore manufacture of parts, Diminishing Manufacturing Sources and Material Shortages (DMSMS), counterfeit parts, and the use of lead-free parts—the need for contractors to have an effective Parts Management Program (PMP) is greater than ever before. The PMP is an integral part of the acquisition process for design, development, modification, and support of weapons systems and equipment.

Parts are the building blocks from which systems are created and, as such, greatly impact hardware dependability, readiness, and operating costs. Parts management is the practice of considering the application, standardization, technology (new and aging), system reliability, maintainability, supportability, and cost in designing or selecting parts and addressing availability, logistics support, DMSMS, and legacy issues in supporting them throughout the life of the systems. Because the reliability and maintainability of the end item is dependent upon these building blocks, the importance of selecting and applying the most effective PMP cannot be overemphasized.

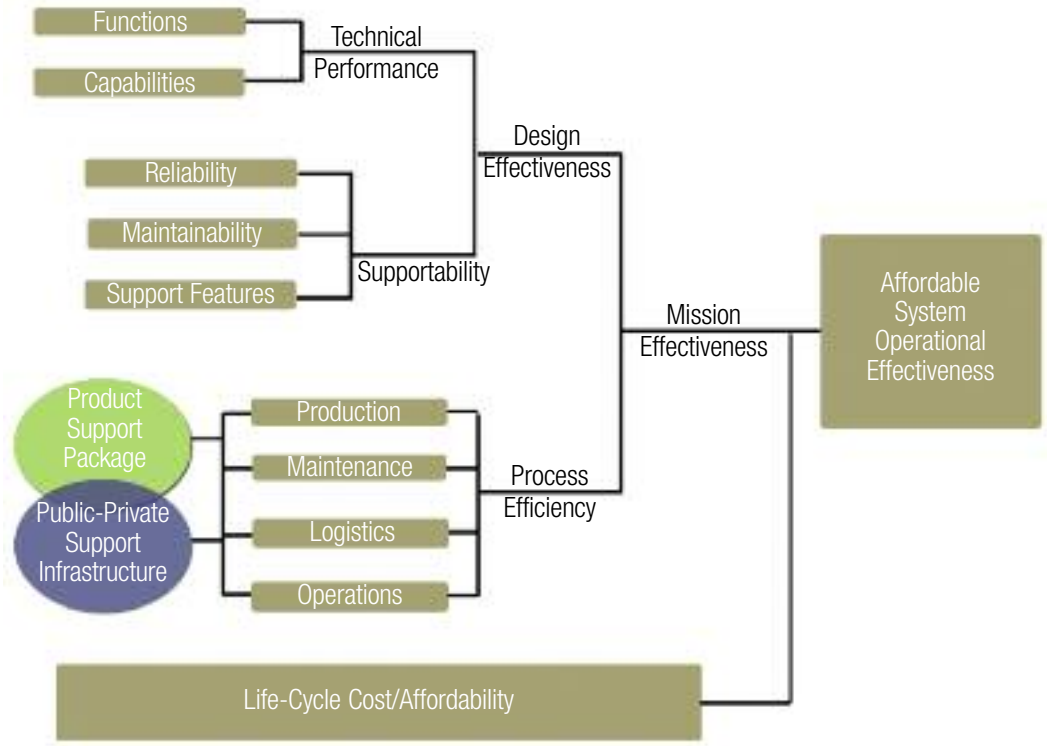
Selecting, specifying, ensuring proper design applications, and, in general, managing parts used in complex systems constitute a major engineering task. As an important element of systems engineering (SE), parts management streamlines the selection of preferred or commonly used parts during the design of weapons systems and equipment. Typically, the use of parts described by non-government standards (NGSs) or military standards or the use of commonly used parts already in the DoD supply system is preferred unless a business case analysis shows that a new unique part would have significant life-cycle cost or other advantages.

The parts management process identifies the optimum parts while considering all the factors that may affect program outcomes. Use of these optimum parts provides the ultimate user, the warfighter, returns that can be measured through enhanced reliability, maintainability, availability, economies of scale, and supportability. In turn, these factors enhance systems performance, logistics and operational readiness, and interoperability, while limiting the logistics footprint, logistics response time, cost per unit usage, and the total ownership costs of weapons systems and equipment.

Affordable System Operational Effectiveness

The *Defense Acquisition Guidebook* (DAG) establishes a framework for affordable system operational effectiveness—that is, the effectiveness, from the warfighters' perspective, with which the system performs its missions over a sustained period.[1] Figure 1 depicts the framework.

Figure 1. Framework for Ensuring Affordable System Operational Effectiveness



Source: *Defense Acquisition Guidebook*, https://acc.dau.mil/CommunityBrowser.aspx?id=489752&lang=en-US, accessed November 14, 2013.

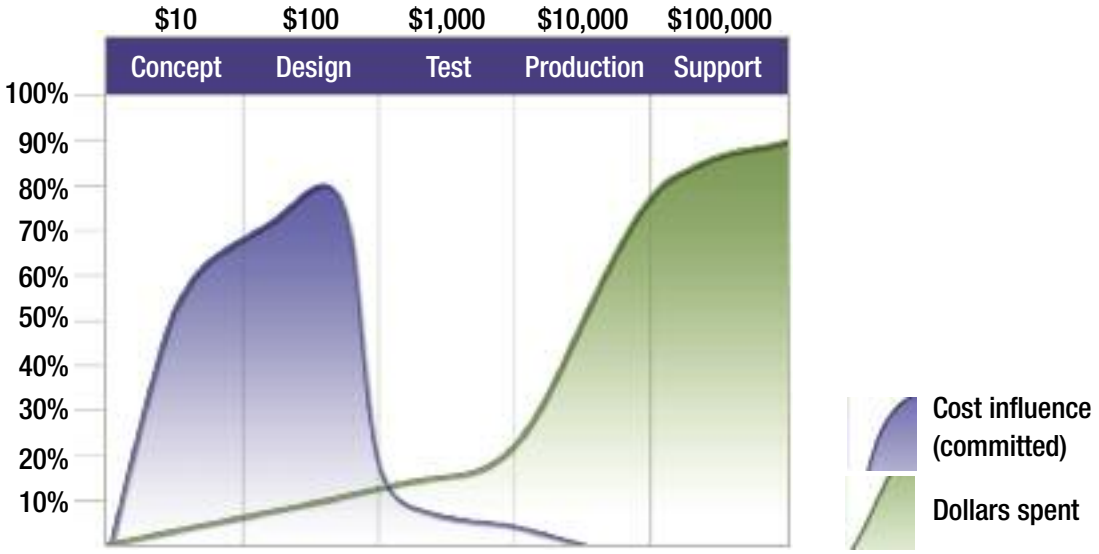
According to the DAG, affordable system operational effectiveness is achieved by designing for the optimal balance among design effectiveness, which encompasses technical performance and supportability; process efficiency, which enables effective product support; and life-cycle cost/total ownership cost. The following sections describe parts management contributions to these three areas.

Design Effectiveness and Parts Management

Figure 2 depicts the spending profile and the commitment of funds for a typical acquisition program. As the figure indicates, although expenditures are relatively small in the early phases of a program, decisions about the system requirements and the design approach to meeting

those requirements have a major impact on the program costs in the outyears. Therefore, implementing an effective parts management plan early in the program can have a significant impact on the program's life-cycle cost.

Figure 2. Notional Spending Profile for a Typical Acquisition Program



Design effectiveness reflects the key design features that provide technical performance and supportability. Parts management contributes to both of these design goals through the tenets of part selection. Choosing the optimum part during design requires consideration of myriad factors, including technical characteristics, reliability, life-cycle cost, commonality, performance history, vendor performance, qualification, potential obsolescence, standardization, manufacturing, and maintenance. The following highlights how parts management contributes to these design considerations:

- *Reliability and maintainability engineering.* Ensuring that the parts selected meet contractual requirements and proper design application is critical to ensuring that the reliability and maintainability requirements of the weapons systems or equipment acquisition contracts are met. Reliability and maintainability have a direct impact on both mission capability and life-cycle cost. The part selection process will also reduce the use of parts with known built-in failure mechanisms, resulting in enhanced reliability, maintainability, and system safety.
- *Standardization.* Reducing the proliferation of part types used in system designs through standardization is important for enhancing material readiness and interoperability and for reducing total ownership costs. Selecting standard or commonly used parts ensures that reliable and documented part types that reduce design risks are used. Use of standard or commonly used parts within and across DoD weapons systems and equipment enhances inter- or intra-departmental part commonality and interchangeability; reduces the variety

of parts in the inventory; enhances part availability, reliability, maintainability, and economies of scale; and reduces part obsolescence occurrences.

- *DMSMS.* Each part selected for design use must be assessed for availability and evaluated based on its projected life cycle to mitigate the effects of DMSMS and minimize the impact on the system equipment production schedule. Parts selected and used in design should be tracked for DMSMS issues throughout the system or equipment life cycle to ensure availability of parts and to provide sufficient lead-time to develop the best solutions to mitigate parts issues in order to sustain fielded systems and reduce life-cycle costs. The Government-Industry Data Exchange Program (GIDEP) and many commercial part-tracking databases are available to provide information concerning when a part is discontinued by its manufacturer. SD-22, *Diminishing Manufacturing Sources and Material Shortages: A Guidebook of Best Practices for Implementing a Robust DMSMS Management Program*, provides information on DMSMS and suggestions on how to address DMSMS issues.
- *Anticounterfeiting.* From a design perspective, anticounterfeiting has close connectivity to DMSMS. Obsolete or near-obsolete parts represent lucrative opportunities for counterfeiters; there will be demand and very limited sources of supply. The parts management tenet of supplier quality is also a factor for this design consideration. The likelihood of purchasing a counterfeit part is greatly reduced if the selected part is available from the original equipment manufacturer (OEM) or an OEM-franchised distributor.
- *Environmental issues.* Parts management considers the environment in which the parts are intended to operate. A part that is acceptable for an environmentally controlled ground site may not be acceptable for use in an aircraft that subjects the part to different environments and stresses. Part types used in land-based aircraft may not be suitable for use in ship-based aircraft that operate in severe marine environments and are more exposed to corrosion.
- *Part and supplier quality.* An important requirement for selecting parts is considering the source of supply and whether the parts are qualified for the application in which they are to be used. Part manufacturers and part distributors who provide the selected part must be required to follow documented and established quality assurance policies and procedures. Those policies and procedures should include, for example, statistical process control data and process controls on manufacturing, material, shipment, storage, notification concerning process changes, customer satisfaction, and quality measurement systems.

In view of the above, it is easy to understand why a disciplined part selection process in the design phase, as part of a formal PMP, increases the probability of using the most optimum parts in DoD weapons systems and equipment.

Process Efficiency and Parts Management

Process efficiency indicates the degree to which the logistics processes, infrastructure, and footprint have been balanced to provide an affordable, agile, deployable, and operationally effective system. Thus, process efficiency encompasses manufacturing, operations, and product support.

Successful manufacturing has many dimensions. For manufacturing readiness assessments, threads have been defined to organize these dimensions into manufacturing risk areas.[2] Parts management contributes to these threads as follows:

- *Industrial base thread.* Parts management establishes the basis for maintaining a parts baseline and includes a rational approach to qualify suppliers, change suppliers, and/or switch parts. It also evaluates whether there is a reasonable path to qualification of both development articles for design verification testing and qualification articles. Finally, parts management determines the extent to which there is a reliance on commercial products and the potential methods for dealing with future parts design changes that are driven by the commercial marketplace.
- *Design thread.* Parts management evaluates the effects of part selection on all applications, considering all requirements. It ensures key design considerations are given sufficient emphasis and that processes are in place to avoid prohibited design practices, e.g., the use of certain hazardous materials.
- *Cost and funding thread.* Parts management ensures that standardization is taken into account to minimize costs (e.g., maximize the use of parts already being used elsewhere). It also identifies the funding needed to perform the activities necessary to determine that the part will work as intended.
- *Materials thread.* Parts management ensures that the material selection process accounts for special handling and corrosion prevention. It assesses selected parts for availability, evaluates them to mitigate future DMSMS effects, and establishes processes to minimize the use of prohibited components, materials, and processes. Furthermore, parts management ensures qualification considerations have been properly addressed by identifying and performing tests and analyses.
- *Process capability and control thread.* Parts management ensures that there is an understanding of the consistency of the design to manufacturing processes and that the processes are sufficient to satisfy the system requirements. It also ensures that special design considerations (for example, the performance of lead-free products) are sufficient for system requirements.
- *Quality management thread.* Parts management ensures quality requirements have been tailored for different commodities. It recommends part failure analysis approaches, determination of the root cause of failures, identification of failure effects on performance, and corrective action accountability. Finally, parts management ensures the establishment of proper controls to avoid the introduction of counterfeit parts. Military systems are increasingly vulnerable to counterfeit parts as a result of schedule and obsolescence issues. Counterfeit parts typically enter the supply chain from sources other than the original component manufacturer's (OCM's) authorized distribution networks.
- *Manufacturing management thread.* Parts management supports the manufacturing planning processes throughout the manufacturing life cycle. Standardization limits the introduction

of new parts, which enables consistent and efficient methods for manufacturing planning and support. Parts management ensures the facilitation of manufacturing support systems and processes such as material requirements planning.

In the operations area, parts management is a consideration in several aspects of supply chain management and operational support:

- *Reduced acquisition lead-time.* When a preferred part is used, government and industry can frequently avoid the expense and delay of designing and developing a new part, as well as the issues associated with acquiring a new item with no available history or documentation. Using preferred parts often reduces the time between the purchase request and the receipt of the parts.
- *Part and supplier quality.* An important factor in selecting parts is whether the parts are qualified for the application in which they are to be used. Part manufacturers and part distributors that provide the selected part must be required to follow documented and established quality assurance policies and procedures. Those policies and procedures should address both the collection of statistical process control data and the implementation of process controls on manufacturing, material, shipment, storage, process changes, customer satisfaction, and quality management.
- *Enhanced logistics readiness and interoperability.* When assemblies or systems share common components, repair time is shorter, because parts are more likely to be in the supply chain. Furthermore, using common components simplifies logistics support and enhances substitutability because fewer parts need to be stocked. This translates to savings in procuring, testing, warehousing, and transporting parts.
- *Increased supportability and safety of systems and equipment.* Preferred parts reduce risk and improve the chances that equipment will perform reliably. Preferred parts have a history of proven reliability, withstanding testing and performing at stated levels. Their use may reduce the number of part failures, thus reducing the number of maintenance actions, increasing operational availability, and potentially precluding failures that could cause mission failure or loss of life.

Parts management impacts two key aspects of product support:

- *DMSMS management.* Parts selected and used in design should be tracked for DMSMS issues throughout the system or equipment life cycle. This helps ensure the availability of parts by providing sufficient lead-time to develop the best resolutions to sustain fielded systems and reduce life-cycle costs. Many part-tracking databases are available to provide information concerning when a part is discontinued by its manufacturer. SD-22 provides information on DMSMS management and guidance on how to address DMSMS issues.
- *Lead-free electronics mitigation.* Executive Order 13423, "Strengthening Federal Environmental, Energy, and Transportation Management," and European Union directives—in particular, "Restriction of Hazardous Substances" and "Waste Electrical and Electronic

Equipment"—restrict or eliminate the use of lead in a variety of products. These restrictions have resulted in the commercial adoption of lead-free solder alloys, typically tin-silver-copper alloys. In addition, industry adopted tin finishes without lead, sometimes codeposited with other elements, such as copper or bismuth. Tin finishes pose risks for short circuits in the assembled electronics due to conductive tin whiskers that grow from these finishes. Parts management ensures the mitigation of risks to military systems posed by the commercial supply chain's transition to the use of lead-free parts.

Total Ownership Cost and Parts Management

Government and industry program managers and contractors must manage their scarce resources carefully to procure the advanced technology systems and equipment needed to provide required capabilities whose cost of operational support when fielded is affordable. Therefore, the total ownership cost of weapons systems or equipment is an important consideration for the program office.

Costs

The costs reflected in the contract should include implementing and maintaining a parts management process for the life of the contract. These costs should support the parts management process elements tasking referenced in MIL-STD-3018, "Parts Management." The costs are a function of the individual weapons system or equipment acquisition contract life-cycle phase. The costs will be highest for the engineering and manufacturing development (EMD) phase, because major design and supporting part selection occurs during EMD. Also during the EMD phase, the contractor should ensure the subcontractors' participation to the extent necessary to meet contractual requirements and the PMP objectives.

Benefits

Parts management helps reduce equipment design and life-cycle costs by promoting the application of commonly used parts. Standardization of parts and the replacement of numerous similar parts with one common part can result in fewer purchase orders and larger procurement quantities of the smaller numbers of unique parts. Larger part-type purchases enable both the contractor and the customer to benefit from the economies of scale. Part standardization also helps the contractor avoid the increased cost of maintaining technical data and storing, tracking, and distributing multiple parts.

Cost-Benefit Analysis

Although many of the cost avoidance factors that are the benefits of parts management are intangible, an analysis of historical parts management data clearly shows that the tangible benefits of reducing the proliferation of part types in new design can be substantial. Cost factors may

vary depending on the organizational and operational structure of a given program or company. The following method for roughly estimating costs uses very conservative values for the factors it includes and does not include values for many nonrecurring and intangible cost factors.

The average total cost for adding a single new part into a system is about $27,500. An effective PMP will avoid this cost every time it precludes unnecessarily introducing a new part into the system. Analysis of historical acquisition program parts management data has revealed that programs without parts management requirements introduce 2.5 percent more new parts into the logistics system than do programs with parts management requirements. Therefore, a program with 10,000 parts may easily achieve a life-cycle cost avoidance of $6.8 million, a not-insignificant amount, through the use of an effective PMP.

As documented by the Parts Standardization and Management Committee in *Reduce Program Costs through Parts Management*,[3] the cost of adding a new part into the inventory derives from six different program areas: engineering and design, testing, manufacturing, purchasing, inventory, and logistics support. Table 1 summarizes these average costs by program activity. While it is possible that in some cases the added costs of adopting a unique part design could be offset by lower manufacturing or purchasing costs, such choices would need to be carefully justified and documented.

Table 1. Average Costs for Adding a Part into a System

Activity	Cost
Engineering and design	$12,600
Testing[a]	1,000
Manufacturing	2,400
Purchasing	5,200
Inventory	1,200
Logistics support	5,100
Total	$27,500

[a]The testing cost was reduced significantly because not every part added to inventory requires testing. However, every part needs to be evaluated, either by similarity, bench test, or analysis.

Parts management is also effective in mitigating and managing part obsolescence problems. The costs of resolving part obsolescence problems have been estimated as ranging from a low cost for part reclamation to a very high cost for a major redesign effort. The DMSMS community is updating these figures, recognizing that today's obsolescence costs have increased considerably. (See Appendix A for references concerning resolution cost factors for DMSMS.)

[1]See https://dag.dau.mil/Pages/Default.aspx.
[2]*Manufacturing Readiness Level (MRL) Deskbook*,Version 2.2, July 2012, http://www.dodmrl.com/MRL_Deskbook_V2_2.pdf.
[3]This document can be found at http://www.convergencedata.net/Docs/PartsMgt.pdf.

CHAPTER 2

TIMING, IMPLEMENTATION, AND RESPONSIBILITIES FOR PARTS MANAGEMENT CONTRACTUAL REQUIREMENTS

Parts Management in the Defense Acquisition System

Parts management should be considered, addressed, and implemented within the phases of the Defense Acquisition Management System as follows:

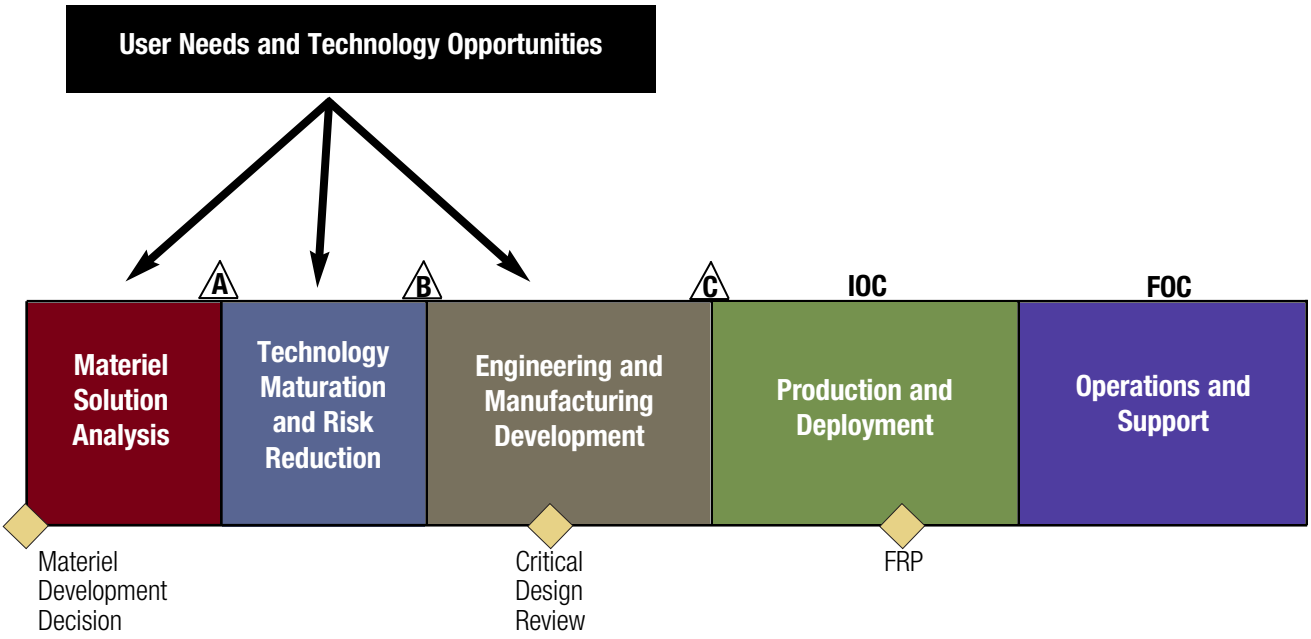
- *Technology maturation and risk reduction phase (Milestone A).* Although parts management requirements for prototypes are not anticipated, architecture and technology decisions affect part selection. All initial determinations and collaborations between the acquisition activity and the contractors concerning the parts management requirements as stated in MIL-STD-3018 should be considered in the development of preliminary designs before Milestone B. All parts management requirements should be specified in the request for proposals' statement of work (SOW) for the engineering and manufacturing development phase.
- *Engineering and manufacturing development phase (Milestone B).* Parts management requirements as stated in MIL-STD-3018 should be called out in the engineering and management development SOW and implemented under an approved parts management plan. During this phase, requirements should be flowed down to subcontractors, and the contractor should review their processes for approval. As subcontractors come "on line," they should implement their approved parts management process. (In terms of practical implementation, this may take some time. Interim procedures may be needed during the process of plan approval, because subcontractors will continue to iterate design and select parts.)
- *Production and deployment phase (Milestone C).* Parts management is required for changes or modification to the baseline design such as value engineering changes or parts obsolescence issues.

Figure 3 depicts the system.

Addressing Parts Management in the Contract

The costly proliferation of parts and equipment within programs should be reduced or minimized through parts management and must be integrated with program planning and SE throughout the entire acquisition life cycle. This is most effectively accomplished by including MIL-STD-3018 on contracts and ensuring the quality of the associated processes.

Figure 3. The Defense Acquisition Management System



Notes: FOC = full operational capability, FRP = full-rate production, IOC = initial operational capability.

A contract normally begins with a solicitation requesting the submission of offers or quotations to the government. The solicitation and its supporting documents establish the technical and management requirements that must be addressed in the contractor's proposal. The contract will normally consist of several individual specifications, including the SOW, the Prime Item Development Specification, and the Contract Data Requirements List (CDRL).

The most effective PMPs are implemented during the initial contract and contract review process. Therefore, it is imperative that the engineer or individual responsible for parts management be involved up front so that all areas affecting parts management can be addressed.

The Contract Statement of Work

Parts management requirements, if needed, should be implemented in the contract through wording contained in the contract SOW, statement of objectives (SOO), or performance work statement (also referred to here as an SOW). The SOW can be written in two different ways. First, the government can write the SOW and ask the contractor to respond with a proposal. Alternatively, the government can include an SOO in the solicitation and ask the contractor to write and submit an SOW within a proposal in response to the SOO.

The SOO is usually a brief statement of the government's objectives for a program. It is not likely to contain enough detail to address parts management. If the solicitation contains an SOO, the contractor's SOW will need to address parts management.

Before determining the wording to be used in the SOW, the following factors should be considered:

- Type of equipment or system, for example, operational system, operational support equipment, test vehicle, or maintenance or shop test equipment. Parts management may not be needed for certain test vehicles, maintenance equipment, or shop test equipment.
- Type of work. For an investigative or study contract, parts management may not be needed.
- Quantity of systems or equipment to be purchased on the contract.
- Reliability, safety, or nuclear hardness criticality of the parts or equipment, coupled with the environment where used (flight, ground combat, ground benign, etc.).
- Whether the item is a new design or a modification of an existing design and, if a modification, the extent of that modification.
- Maintenance concept, for example, organic or contractor logistics support, or performance-based logistics.
- Whether all or some of the equipment items are off-the-shelf (OTS) items or non-developmental items (NDIs). (Parts management is not required for OTS items or NDIs, except for modifications that introduce new parts into the design.)
- Ownership and level of technical data package, if required.

Depending upon the criteria above, there may be different tasks for different types of equipment within the same SOW. If so, each task should identify the level of parts management applicable to the specific equipment or types of equipment (such as support or test equipment).

Below is an example of a generic SOW that may be incorporated into contracts. The specific acquisition requirements may require tailoring of the principal SOW tasks.

> The contractor shall establish and maintain a Parts Management Program in accordance with MIL-STD-3018 for all new designs or modified equipment. This program will ensure that the use of parts meets contractual requirements, reduces proliferation of parts within and across DoD weapons systems and equipment through standardization, enhances reliability and supportability to meet material readiness objectives, and reduces total life-cycle costs. Also, the contractor shall describe how the parts management process is validated, how process improvements are incorporated, and how process variation is controlled.

The following statement may be added to the example paragraph above:

> The contractor shall document the plan in accordance with Data Item Description (DID) DI-SDMP-81748 and deliver the plan in accordance with the CDRL (DD Form 1423).

The following paragraph may be added to the example paragraph to address additional data and part use information and assist with validating the contractor's parts management process:

> The procedures, planning, and all other documentation, media, and data that define the Parts Management Program and the parts selected for use shall be made available to the government for its review. The government may perform any necessary inspections, verifications, and evaluations to ascertain conformance to requirements and adequacy of the implementing procedures.

To satisfy the mission-essential needs of a specific acquisition, it may be desirable to tailor the selection of parts from the preferred parts list (PPL) or baseline. This can be accomplished by limiting the selection of parts to a specific type, grade, or class. Such limitations of parts should be specified in the SOW.

Parts Management Responsibilities during the DoD Acquisition and Sustainment Process

Both the DoD acquisition activity and the contractor have responsibilities to ensure that the PMP meets contractual requirements and its goals and objectives:

- *Acquisition activity responsibilities.* Systems engineers—or their designated PMP managers, integrated product team (IPT) members, or other individuals responsible for parts management—are responsible for determining and tailoring all initial parts management requirements, coordinating and negotiating those requirements with the contractor, and evaluating and approving the required contractor-submitted plans or processes. They are also responsible for ensuring that contractually approved plans are implemented and meet PMP objectives, as listed in MIL-STD-3018, during the engineering and manufacturing development, production and deployment, and operations and support phases. The responsible individuals may also request technical interchange or parts management IPT meetings to address and resolve any part-type issues and facilitate interacting or teaming with their industry counterparts to ensure that requirements are met. They are also responsible for approving any contractor-initiated changes to the plan such as value engineering change proposals that reduce both government and contractor costs.
- *Contractor responsibilities.* The contractor's designated PMP manager is responsible for teaming with the acquisition activity to implement PMP contract requirements. Part selection and application are the responsibility of the contractor whose primary requirement is to meet the performance objectives of the system or equipment. The contractor's designated PMP manager is responsible for approving all selected parts and for ensuring that the contractor's parts management processes meet their intended objectives. The designated individual is also responsible for managing subcontractors' participation concerning contractual requirements, as well as all other aspects of the contractor's contractually approved processes. The contrac-

tor should interact or team with its acquisition activity counterpart to ensure mutual awareness of all part-type issues and any recommended changes to the contractor's processes that could affect program objectives. The contractor should conduct or support technical interchange or parts management IPT meetings to ensure that contractual requirements are met.

- *SE technical review responsibilities.* SE technical reviews are used throughout the life cycle as a means for the program office to "evaluate significant achievements and assess technical maturity and risk. … They allow the Program Manager and Systems Engineer to jointly define and control the program's technical effort by establishing the success criteria for each review and audit."[4] Appendix B identifies a number of specific parts-management questions for use in support of technical reviews. The parts management questions offered in that appendix have been designed for use by the parts management community to inform discussions before the technical reviews and to highlight issues to be addressed during the reviews.
- *Logistics assessment (LA) responsibilities.* The implementation of LAs during weapons system development, production, and post-initial operational capability (IOC) acquisition phases was recommended by the DoD Weapons Systems Acquisition Reform Product Support Assessment to improve the effectiveness of product support.[5] Appendix B identifies a number of specific parts management-related questions for use in support of LAs. As was the case for SE technical reviews, the parts management-related questions offered in the appendix have been designed for use by the parts management community to inform discussion before the LAs and to highlight parts management issues to be addressed during the LAs.

[4]*Defense Acquisition Guidebook*, https://acc.dau.mil/CommunityBrowser.aspx?id=638315&lang=en-US, accessed November 14, 2013.
[5]*Logistics Assessment Guidebook*, July 2011, p. 2.

CHAPTER 3

ELEMENTS OF A PARTS MANAGEMENT PROGRAM

Parts Management Plan

A parts management plan is a contract-specific application of a contractor's corporate parts management procedures that meets the objectives of the equipment system's mission profile, support strategy, expected service life, and the DoD parts management goals and objectives of reducing the logistics footprint and total life-cycle cost, and increasing the logistics readiness.

A parts management plan communicates how the contractor's in-house parts management process is conducted under the MIL-STD-3018 plan elements. The plan should delineate the management structure, responsibilities, procedures, and controls (including subcontractor requirements) for the contractor's Parts Management Program. It usually is prepared by the contractor's standards, component, reliability engineer or the person responsible for the parts management requirement—referred to here as the parts management engineer—in response to a contractual SOW requirement.

The parts management plan elements to be addressed are as follows:

- *Part selection baseline.* A corporate baseline (CB), parts selection list, or other databases must be maintained to give visibility to designers and subcontractors of parts preferred for use to achieve part standardization goals over the total life cycle. In addition, the contractor is encouraged to use government-furnished automated tools to assist in the parts selection process.
- *Part selection and authorization.* The management and organizational structure for standardization functions, the authority and responsibility for standardization policy, and procedures for authorizing new parts in design must be included. The procedures must identify the entity responsible for authorizing parts for use. The procedures must also identify the structure and membership of a parts selection IPT, if applicable. Criteria used to ensure the suitability of a part's intended use to the required application, order of preference used in considering new parts, and procedures for notifying associated disciplines (inventory, purchasing, quality assurance) in case of authorization of a new part also must be included.
- *Obsolescence management.* The plan must include procedures for obsolescence management, such as proactive obsolescence forecasting and mitigation for applicable part types (e.g., microcircuits), and plans for reacting and developing solutions to obsolescence impacts as they occur and affect the program. SD-22 provides guidance in the area.

- *Parts list or bill of materials (BOM).* The plan must detail how and when the contractor submits initial and updated parts lists or BOMs to the government, as required by contract.
- *Subcontractor management.* The plan must describe contractor procedures for establishing and maintaining subcontractor participation to the extent necessary to ensure satisfaction of the parts management objectives.
- *Part and supplier quality.* The plan must describe provisions for assessing part suppliers and part quality, such as statistical process control data, audits, and past performance.
- *Part-level documentation procedures.* Part-level documentation procedures must be detailed and consistent with the program's configuration management, logistics strategies, and total life-cycle requirements.
- *Substitute and alternate part procedures.* The process for the management, definition, and documentation of substitute and alternate parts must be described. In specifying the part replacement process, the contractor must ensure the program is consistent with the intent and application of SE disciplines (configuration management, quality, logistics, etc.).
- *Customer-contractor teaming.* The parts management plan must address customer teaming to allow for continued insight into processes for program verification. Examples of teaming are IPT participation, technical interchange meetings, exchange of logistics data, and verification of performance metrics.
- *Counterfeit parts.* The parts management plan must address the detection, mitigation, and disposition of counterfeit parts, including electronic, electrical, and mechanical parts. SAE International's AS5553 should be used for guidance for electronic parts.
- *Lead-free electronic parts.* The parts management plan must address the process to manage the risk associated with using lead-free parts. TechAmerica GEIA-STD-0005-1 may be used for guidance for lead-free electronic parts.
- *Additional elements (lead free, counterfeit parts, etc.).* The process for addressing those additional elements, as identified by contract, must be defined.

The acquisition activity should review the parts management plan against the requirements of MIL-STD-3018. After approval of the plan, the contractor is responsible for meeting the requirements of the plan and recommending changes to the plan depending on part type, technical or environmental issues, or changes in the parts procurement business environment. All plan revisions must be coordinated and approved by the acquisition activity.

The following sections detail some of the elements of a parts management plan.

Preferred Parts List or Corporate Parts Baseline

The PPL should be maintained in an electronic database and be readily available in-house. A preferred method is to tie the PPL to a computer-aided design (CAD) library or repository.

This technique will avoid duplication of effort and ensure that only the parts listed in the PPL are used. The PPL should be made available for use as early as possible during the design stage.

The intent of a PPL baseline is to maximize standardization during design by tailoring, streamlining, and minimizing the variety of types, grades, or classification of parts used in an acquisition. A PPL baseline should be used when parts are to be managed in a parts selection practice. Tailoring the PPL baseline requirements for a specific contract should be based on the following factors:

- Restrictions on the use of certain parts or part types
- Limitations in design imposed by part usage restrictions
- Reliability requirements
- DMSMS.

Parts Selection and Authorization

An in-house parts selection process should be followed and documented by the parts management representative, Parts Management Board (PMB), or IPT. Procedures for authorizing new parts should be included. The procedures should identify the entity responsible for authorizing parts for use and the structure and membership of the PMB or IPT, if applicable. Figure 4 is an example of a part selection process.

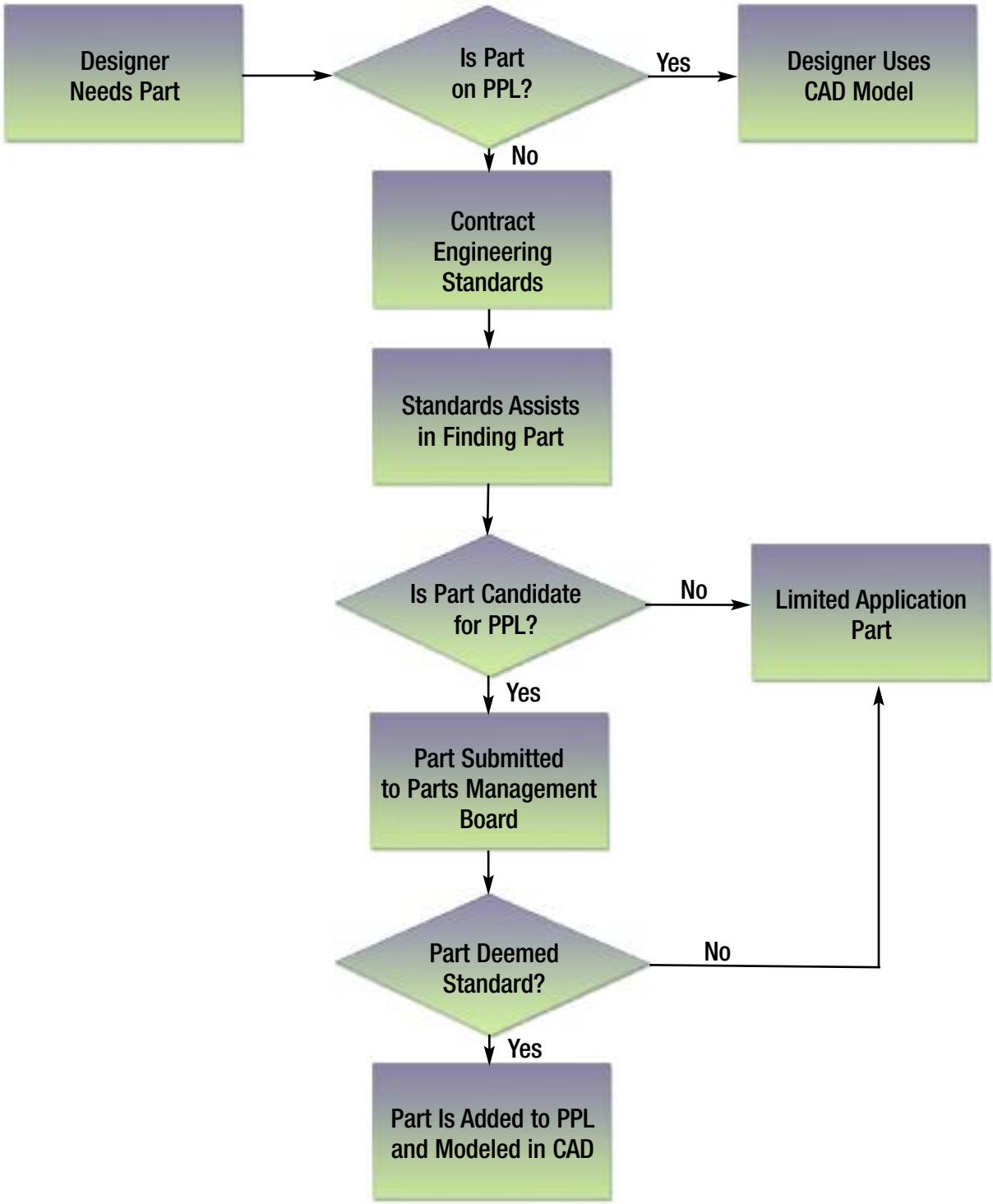
Order of Preference for Parts Selection

To maximize standardization and reduce life-cycle costs, parts should be selected based on the order of preference list in MIL-STD-3018, as applicable. Depending on contractual requirements, the following part selection criteria should be taken into account:

- Availability (DMSMS concerns, aging technology, number of sources)
- Application (derating, operation, use of the part, type of environment in which the part will be used)
- Cost-benefit analysis
- Part screening
- Qualification test data or past performance data
- Supplier selection
- Part technology/obsolescence (use of DMSMS databases, GIDEP)
- Compliance with contract performance requirements
- Technical suitability
- Government life-cycle cost optimization.

If alternate or substitute parts are to be selected, consider them in descending order of preference (i.e., most desirable to least desirable).

Figure 4. Parts Selection Process



Obsolescence Management and Diminishing Manufacturing Sources

Obsolescence management is a discipline in and of itself. As the service life of a product extends beyond the technology life cycle incorporated in the design, obsolescence and DMSMS problems arise. Both the defense and commercial markets must find ways to plan for and manage obsolescence and DMSMS, because every product is subject to their effects. In other words, to be successful, parts management must address DMSMS throughout the product's life cycle.

Identification and resolution of DMSMS problems have both proactive and reactive elements. On the proactive side, prospective DMSMS situations need to be addressed during the initial phases of product development or modification. Current and potential DMSMS items need to be identified early in the product design phase, and associated design tradeoffs must be made to minimize life-cycle vulnerability. Reactive efforts, on the other hand, find cost-effective solutions to DMSMS problems identified during the production phase or in fielded units. A coordinated program approach, one that includes both proactive and reactive efforts, will support product availability and readiness objectives.

Several commercial companies identify obsolete parts and DMSMS and predict the life expectancy of parts. Other sources of information include GIDEP, which is the source of DMSMS information for the military services' DMSMS programs, and the Parts Management Advisory Team (PMAT). Both groups perform parts DMSMS obsolescence screening, data gathering, and dissemination for DoD and its contractors. One or more of these services should be an active part of the DMSMS and obsolescence program of every organization involved in the design and production of electrical and mechanical products.

Subcontractor Management

Engineers and/or parts management personnel should participate in the technical evaluation of a subcontractor's response to a solicitation to ensure that the subcontractor has complied with parts management requirements. The prime contractor must ensure compliance to their parts management plan or program. The parts management engineer, or equivalent, should be responsible for reviewing, verifying, and approving the subcontractors' parts management process.

In addition, a monitoring and feedback process should be used to review and evaluate any changes to established procedures. A good way to assess parts management is to form an IPT consisting of representatives of the contractor and subcontractors. The engineer should assist the IPT by analyzing the subcontractors' parts data. The IPT should review and resolve any adverse findings. The contractor may request that the customer participate on this IPT.

Part and Supplier Qualification Requirements

All processes used to qualify parts, parts manufacturers, and parts distributors should be documented following established quality assurance policies, procedures, and applicable standards. Parts should be qualified for the application in which they are used, and they should be assessed for supportability and life-cycle cost issues. Qualification of parts manufacturers and distributors may include an assessment of the manufacturer's documented processes, for example, its statistical process control data and its process controls on manufacturing, material, shipment, storage, notification concerning process changes, customer satisfaction, and quality measurement systems. In addition, depending on the contracted requirements associated with the part under interest, such special process controls as lead-free control and counterfeit control may be appropriate for assessment.

The parts management engineer should participate in (or have access to) the technical evaluation of suppliers and in the review and approval of suppliers' manufacturing processes and parts changes. Appendixes C and D contain additional guidelines that may be helpful.

Substitute Part Practice

Substitute, alternate, and superseding part procedures may be required to address parts procurement issues and DMSMS issues:

- Alternate part—a part that possesses functional and physical characteristics so as to be equivalent in performance, reliability, and maintainability to an original design part without selection for fit or performance. An alternate part should be subject to the same part selection review and approval process as the original design part and should be included on the BOM.
- Substitute part—a part that possesses functional and physical characteristics so as to be capable of being exchanged with the design part only under specified conditions, or in particular applications, without alteration of the parts themselves or adjoining items. Substitute parts should be reviewed and approved in accordance with PMP requirements.
- Superseding part—a part deemed desirable for use as a replacement part for the original design part (which becomes the superseded part). A superseding part meets all requirements of an alternate part, but is used exclusively in lieu of the original design part.

A substitute parts practice should never be used as a method to address failed parts, safety-critical issues, or elements in which Class 1 changes (changes that must be approved by the government) or redesign may be involved. Below are some important things to consider when selecting alternate or substitute parts:

- *Substitute parts list (SPL) reference.* The SPL must be referenced directly on the drawing or BOM, or incorporated by reference in a separate specification called out in the drawing or BOM.

- *Contract requirements and customer notification*. The customer needs to be notified that an SPL exists. This notification can be accomplished by response to the solicitation or by submission of the company's parts management plan that describes its SPL procedures.
- *Depleting existing parts stock*. When an existing part is superseded, the determination must be made whether to deplete or to purge the existing inventory (deplete old and use new—versus purge old and use new). Remember that when a part is replaced by a superseding part, if the superseded (old) part is being eliminated to meet a standardization requirement or for standardization purposes, existing stock is depleted before going to the superseding (new) part.

Counterfeit Parts

Effective parts management requires implementation of measures to prevent incorporation in military equipment of counterfeit items that can affect functional, cost, and schedule performance. The increasing reliance on commercial items makes military systems more vulnerable to the growing amount of counterfeit items in the global supply chain, but counterfeiting can even occur with items unique to military applications. Some notable commodity classes recently experiencing growth in counterfeit risk include microcircuits and semiconductors. Common counterfeiting practices include re-marking parts to indicate different temperature performance levels (e.g., changing marking from commercial temperature range to industrial temperature range), functional performance level (e.g., changing speed grade on a microprocessor), and interconnect finish (e.g., changing marking code from pure tin to tin-lead finish indicator).

Industry working groups and standards, such as SAE International's AS5553 and AS6174, have identified best practices for preventing procurement of counterfeit items that parts management plans should incorporate within their processes and procedures. The most important practice includes establishment of procurement procedures that allow purchase of items only from the original manufacturer or the original manufacturer's franchised distributors. Procurement of items from other sources must address the counterfeit risk through documented procedures of thorough documentation analysis and test of the items. In addition, it is critical that parts management plans require industry notification of suspect and confirmed counterfeit items and sources through systems such as GIDEP, as well as procedures that prevent reintroduction of suspect and confirmed counterfeit items back into the supply chain. The entire supply chain must become aware of the counterfeit risk and work in concert to prevent introduction of counterfeit items into military equipment.

Lead-Free Electronic Parts

Military systems have long depended on tin-lead alloy solders to meet system requirements, and the military design, qualification, reliability, and support infrastructure reflects the use of these alloys. Lead-free solder alloys have very different material properties than tin-lead alloys

and require different assembly processes. Their performance is not fully characterized to support qualification and repair requirements. In addition, military applications have required part finishes compatible with tin-lead solder.

The risks posed by the commercial supply chain's transition to lead-free parts require implementation of disciplined risk management approaches that are documented in a lead-free control plan. Two industry standards address the primary issues involved with the current electronics supply chain: TechAmerica GEIA-STD-0005-1, "Performance Standard for Aerospace and High Performance Electronic Systems Containing Lead-free Solder," and GEIA-STD-0005-2, "Standard for Mitigating the Effects of Tin Whiskers in Aerospace and High Performance Electronic Systems." An effective parts management plan must include provisions that address the requirements of these standards.

Parts Management Plan Structure

DI-SDMP-81748 contains the format and content instructions for data required in a parts management plan. This DID specifies that the plan shall be in the contractor's format.

The following is an example of a structure for a parts management plan.

1 *Cover Page.* General cover page content.

- 1.1 *Approved By Signature List.* Capture list of approval signatures needed for the plan.
- 1.2 *Record of Revision.* Track revision history.
- 1.3 *References.* List references mentioned in the plan.

2 *Scope.*

- 2.1 *Objective.* Define objective of the plan.
- 2.2 *Applicability.* Define what program/system the plan applies to.
- 2.2.1 *Applicable Part and Material Categories.* Define the types of parts, materials, and processes the plan applies to.
- 2.2.2 *Applicable Documents.* List specifications, standards, handbooks, etc., that form a part of the plan.
- 2.3 *Definitions.* Define appropriate terms used in the plan.

3 *Parts Management Infrastructure.* Detail the enabling resources and capabilities available for the program.

- 3.1 *Parts Team Participants.* List the representatives from the specific organizations that will participate as core members of the parts team; this includes customer participation. (The parts team is typically responsible for the overall parts management program.)

3.2 *Tasks and Responsibilities.* Describe the tasks for which the parts team is responsible (coordinate/execute part selection and approval process, subcontractor management, tin whisker risk mitigation, etc.).

3.3 *Parts Team Meetings.* Detail how the parts team will interface.

3.4 *Parts Management Tools.* Identify the primary tools available to assist the parts team and parts management process, such as a corporate preferred parts baseline, Defense Parts Management Portal, etc.

4 *Parts Management Operations.* Detail how the infrastructure elements will be applied to the program.

4.1 *Part Selection Procedure.* Describe the parts selection process, including the order of preference.

4.1.1 *Specific Part Type Selection Criteria.* Detail any part restrictions or specific selection criteria by part type/commodity that applies to the program.

4.2 *Part Approval Process.* Describe the authorization process to use parts on the program.

4.3 *Part Documentation.* Detail the part-level documentation necessary for the program.

4.4 *Part and Supplier Quality.* Describe provisions for assessing part suppliers and part quality.

4.5 *Obsolescence Management.* Describe the proactive process used to mitigate obsolescence risk and procedures for reacting to and solving obsolescence impacts as they occur.

4.6 *Substitute and Alternate Part Procedures.* Describe the process for the management, definition, and documentation of substitute and alternative parts.

4.7 *Parts List.* Detail how and when initial and updated parts lists will be submitted to the government.

4.8 *Counterfeit Parts.* Detail the process for the detection, mitigation, and disposition of counterfeit parts.

4.9 *Lead-Free Electronic Parts.* Detail the process for managing the risk associated with using lead-free electronic parts.

4.10 *Additional Elements.* Detail the processes for addressing additional elements (for example, part derating) that are not mandated by MIL-STD-3018 but are related to parts management and are relevant to the program.

4.11 *Subcontractor Management.* Describe the procedures that ensure subcontractor-furnished equipment satisfies the parts management objectives for the program.

Appendix A. *Abbreviations.*

Parts Management Effectiveness (Metrics)

To measure the effectiveness of a PMP, the parts management representative, PMB, or IPT should collect data to quantify its progress and identify trends. A basic metric is the percentage of preferred parts used, calculated as follows:

(number of preferred parts in BOM ÷ total number of parts in BOM) × 100.

Other metrics may be based on program needs.

Feedback

An important element of effective parts management is feedback. The parts management engineer needs feedback from all the functional areas to ensure that standardization requirements are meeting the objectives of the parts management plan. Feedback also is useful for identifying possible problem areas in a PMP. Sources of feedback information include the following:

- *Subcontractors.* Difficulties a subcontractor may be experiencing in manufacturing an item can often be alleviated by part substitutions. If the prime contractor maintains the design configuration of a subcontracted component, communication between the prime and the subcontractor is important to ensure that these changes are properly reflected in the parts management documentation.
- *Quality deficiency reports.* Reports of quality problems with parts come from many sources; use of this information can preclude use in future designs of parts with ongoing quality issues.
- *Customers.* Problems identified by the customer on fielded systems often indicate a need for parts selection changes.
- *Suppliers.* Part or component suppliers are valuable sources of information about the availability of items. Information from these sources can also help identify high-cost items and potential duplicate part numbers.

There are many sources of, and uses for, feedback information. The important thing to remember is that parts management is a dynamic practice. It needs periodic adjustments based on data and experience acquired from initial design all the way through production, sustainment, and material disposal. Other areas of feedback include design engineering, purchasing, manufacturing, logistics support, and PMATs.

CHAPTER 4

PARTS MANAGEMENT BOARDS AND INTEGRATED PRODUCT TEAMS

PMBs or IPTs may be used to address the various part-type technical or procurement issues during the part selection process to assist with meeting the overall objectives of the contractual parts management requirements.

Parts Management Boards

The PMB is responsible for implementing effective standardization and parts management and for promoting the standardization and commonality of parts and processes across product lines. The PMB is responsible for screening and evaluating parts to be utilized in a specific system and should be established as early as possible to support the part selection process.

Because the PMB enhances the implementation of concurrent engineering, its membership may include representatives from the following disciplines and entities:

- Design engineering
- Procurement
- Engineering standards
- Manufacturing
- Reliability
- Quality
- Subcontractors and suppliers
- Customer.

General Responsibilities of the PMB Members

PMB members have the following general responsibilities:

- Attend board meetings as representatives of their departments/organizations.
- Bring parts issues to the PMB for discussion and resolution.
- Identify procedural deficiencies whose resolution will improve part standardization and reduce cost.
- Identify candidate parts for usage or replacement.
- Have the authority to act on behalf of their department in selection of standard parts, the approval and implementation of the PPL, and policies concerning those parts selected.
- Review requests to add parts to the PPL or CB based on the criteria identified in the section on parts selection and authorization.

- Evaluate and recommend approval or disapproval of parts proposed for listing on the PPL. When requested, respond to balloted (potential) parts for possible inclusion in the PPL or CB.
- Ensure maximum use of standard parts. Minimize the number of different types and styles of parts used in the equipment or system. Assist in identifying and solving standard part issues.
- Ensure timely implementation of parts decisions.
- Specify requirements for part candidates.
- Assist in evaluating standard part suppliers.
- Establish requirements and screen parts for the substitute parts list.
- Promote policies and procedures that ensure efficient parts management operation.
- Review and consider feedback regarding the PMP.
- Review and evaluate program metrics and consider changes to program processes and procedures as required in order to effectively meet PMP objectives.
- Assist in the review and evaluation of subcontractor parts management plans.

Chairperson

The parts management engineer's supervisor (or designee) should be the chairperson of the PMB. The responsibilities of the chairperson (or designated representative) are as follows:

- Chair PMB meetings.
- Schedule PMB meetings, coordinate tasks, distribute agendas and minutes, and maintain records of PMB activities.
- Ensure all PMB actions are completed.
- Supervise preparation and maintenance of the PPL or CB.
- Supervise creation and maintenance of a CAD-modeled PPL parts library.
- Document all PMB decisions.
- Serve as liaison to the PMAT.
- Supervise preparation and maintenance of the substitute parts list.
- Perform all duties listed below for respective group members.

Members

PMP members do, or have the authority to do, the following:

- Participate on the PMB.

- Assist in selecting standard parts to be used in a program.
- Ensure that the standardized PMP is based on the company requirements and any program contractual requirements.
- Audit parts lists and assembly drawings to ensure that products incorporate preferred parts and that the maximum quantity of preferred parts (consistent with design requirements) is selected.
- Establish, monitor, and maintain metrics to ensure that the most efficient parts management practice is in place.
- Approve and disapprove the use of nonpreferred parts.
- Require the use of preferred parts when it can be demonstrated that the preferred part is interchangeable with and equal to, or better than, the nonpreferred part.
- In design reviews, facilitate incorporation of preferred parts through IPTs.
- Identify candidate parts for the substitute parts list or PPL and recommend their inclusion to the PMB.
- Direct the preparation of documentation for preferred parts not documented by a defense specification or standard or an NGS.
- Prepare and maintain a problem parts list that identifies parts and suppliers with a documented history of problems and noncompliance. Report to GIDEP nonconforming products, services, and processes from suppliers and subcontractors that adversely affect safety, health, and environment, in accordance with Office of Management and Budget Policy Letter 91-3.
- Coordinate, prepare, and maintain a PPL that lists the standard parts designated as preferred for use in equipment.
- Maintain files that include a list of PPL parts that have been reviewed by the PMB, a list of the acceptable substitute parts, and a list of any parts being reviewed by the PMB.
- Apply use or application restrictions on nonpreferred parts.
- Review part performance history and provide an impact assessment to the PMB.
- Review existing specifications and test data and report on their impact on preferred parts.
- Review known acceptance part failures and advise the PMB when such failure may affect the status of a PPL part.
- Ensure that GIDEP information is factored into preferred parts actions and that relevant information is captured in the appropriate databases.
- Interface with NGS bodies (such as SAE International or the Aerospace Industries Association) to ensure that interests are addressed.

Integrated Product Teams

IPTs work toward the common goal of developing or producing a military system or equipment. They are cross-functional teams formed for the specific purpose of delivering a product for an external or internal customer. IPT members should have complementary skills and be committed to a set of performance objectives, a common purpose, and an approach for which they hold themselves mutually accountable. IPTs are essential to the implementation of parts management.

Members of an IPT represent the technical, manufacturing, business, and support functions critical to developing, procuring, and supporting the product. When these functions are represented during parts management activities, teams can consider alternatives more quickly, and in a broader context, and reach faster and better decisions.

Once on a team, the IPT member no longer functions solely as a member of a particular functional organization who focuses on a given discipline. Instead, he or she functions as a team member who focuses on a product and its associated processes. Each individual should offer his or her expertise to the team and acknowledge the expertise of other team members. Team members work together to achieve the team's objectives.

The following factors are critical to formation of a successful IPT:

- All functional disciplines influencing the product throughout its lifetime should be represented on the team.
- A clear understanding of the team's goals, responsibilities, and authority should be established between the business unit manager, the program and functional managers, and the IPT members.
- Resource requirements such as staffing, funding, and facilities must be identified.

These factors can be defined in a team charter that provides guidance.

CHAPTER 5

PARTS EVALUATION SUPPORT

Parts Management Advisory Team

Today, DoD acquisition activities and DoD contractors often need to select parts without the infrastructure that will enable them to fully research those decisions. PMATs are available to assist them in making their selections. PMATs provide technical advice on individual electronic, electrical, and mechanical parts, or on parts lists, at no cost to the requesting program. Points of contact can be found at http://www.landandmaritime.dla.mil/programs/pmatdir.

A PMAT's part selection advice may produce alternatives that reduce cost, time, risks, and parts proliferation, while improving quality and supportability through the use of proven, standard parts. Contractual requirements, parts data, and unique evaluation criteria supplied by the submitter constitute the basis of these reviews.

Below are other useful services provided by the PMATs:

- *Information on parts and stock availability.* The PMATs provide information to identify parts obsolescence trends in the commercial marketplace. They also can provide information on Defense Logistics Agency (DLA) stock availability, spare parts procurement plans, and approved alternate national stock numbers.
- *Commercial part recommendations.* The PMATs recommend parts covering the spectrum of reliability levels from commercial standard parts, to unique military parts, to space-level parts. They tailor their recommendations to contract or customer requirements, including commonly used commercial parts such as commercial item descriptions (CIDs) and NGSs, engineering drawings like standard microcircuit drawings (SMDs) and engineering drawings from DLA supply chains, and standard parts covered in defense specifications. The PMATs will also take into account the effects of the parts on life-cycle costs (including logistical support) and standardization before making their recommendations.
- *DMSMS information.* The PMATs review individual parts and parts lists for DMSMS impact on producibility, supportability, and maintainability. Contractors and acquisition activities use the results of these "health of system" reviews to evaluate the need to solve DMSMS problems through redesign, bridge buys, or part and printed circuit board emulation.
- *Responsiveness.* The PMATs handle routine reviews in about 10 days. Reviews of large parts lists may take longer depending on the urgency, size, and complexity of the submitter's evaluation criteria.

- *Partnering.* The PMATs partner with OEMs, acquisition activities, and other industry and government organizations for the following purposes:
  - Develop standardized CBs.
  - Identify common parts used throughout industry through a variety of tools.
  - Assist companies, as parts management experts, with their standardization and parts management efforts.
  - Assist with developing viable PMPs and provide advice relating to parts management in solicitations.
  - Provide and update DMSMS information by screening CBs for obsolete and near obsolete parts when requested to do so.
  - Provide source-of-supply information on obsolete parts, qualified products lists, and source-of-supply quality problems.
  - Provide part history, application, quality, and trend information useful for determining life-cycle cost.
  - Assist with establishing NGSs, CIDs, or defense specifications, as applicable, for commonly used vendor items and corporate documented vendor parts to eliminate duplication and provide standardization.
  - Participate on IPTs and in technical interchange meetings with contractors, subcontractors, and military service acquisition activities.
- *Guidelines for providing supporting documentation to PMATs for part selection advice.* Supporting documentation is not required for parts that are defined by DoD standardization documents. These documents include defense and Federal specifications, CIDs, NGSs, and SMDs. Documentation may be necessary for all other parts.

Tools Supporting Parts Management

The following Internet-based and automated tools are available to assist with achieving parts management goals and objectives. Most, if not all, will require the users to establish authorizations and passwords for access. The tools are as follows:

- *Defense Parts Management Portal (DPMP).* The DPMP provides links to various parts management tools used throughout the life cycle of DoD systems. The tools enable users to access parts management information through a single point of entry. The intent of the tools is to provide engineering and material data relevant to design, parts availability, parts obsolescence, and parts program management information. This portal should help acquisition offices, designers, and specification preparing activities make informed decisions on PMPs, parts selection, and standardization.
- *Acquisition Streamlining and Standardization Information System (ASSIST).* ASSIST is a comprehensive website providing access to current information associated with military and Federal specifications and standards in the management of the Defense Standardization

Program. Managed by the DoD Single Stock Point located in Philadelphia, PA, ASSIST provides public access to standardization documents over the Internet. ASSIST has many powerful reporting features and an exhaustive collection of both digital and warehoused documents. ASSIST is the official source of DoD specifications and standards. This tool is available at http://assist.dla.mil.

- *DMSMS/obsolescence tools.* Various tools, both commercial and government, are available to assist with mitigating the impact of part obsolescence (e.g., DMSMS, Knowledge Sharing Portal website: http://acc.dau.mil/dmsms). Several commercial companies can supply services that identify obsolete parts and diminishing manufacturing sources and predict the availability of parts. Government sources, including GIDEP (whose website can be accessed from the DMSMS site shown above), perform parts DMSMS obsolescence screening, data gathering, and disseminating for DoD and its contractors.
- *Document Standardization Division website.* The Document Standardization Division of DLA Land and Maritime is the preparing activity for thousands of parts specifications and drawings for electronic components. This website (http://www.landandmaritime.dla.mil/programs/milspec/docsearch.aspx) has search tools to aid in the identification and selection of high-quality and high-reliability standard electronic components (DLA Land and Maritime Specification Finder, Standard Microcircuit Cross Reference, etc.).
- *Federal Logistics Information System (FLIS).* An automated data processing system, FLIS is designed to provide a centralized data bank in support of DoD, Federal civil agencies, and foreign countries participating in the integrated logistics support program. FLIS provides essential information about supply items, including the national stock number, the item name, manufacturers and suppliers (including part numbers), freight data, hazardous material indicators, interchangeable and substitutable items, management data, and physical and performance characteristics. The WebFLIS restricted version has additional search features: multiple National Item Identification Number (NIIN) inquiry and unique item tracking. Users can perform searches for up to 2,500 NIINs at a time in the multiple NIIN inquiry field. Inquiries may be typed individually, cut and pasted from a spreadsheet or a Word document, or entered as a comma-separated value (see http://www.dlis.dla.mil/webflis/). A search feature for multiple part numbers is being planned.
- *GIDEP.* GIDEP is a DSPO-sponsored cooperative activity between government and industry participants seeking to reduce or eliminate resource expenditures by sharing technical information essential during the research, design, development, production, and operational phases of the life cycle of systems, facilities, and equipment. GIDEP data can materially improve the total quality and reliability of systems and components during the acquisition and logistics phases of the life cycle and reduce costs in the development and manufacture of complex systems and equipment. For more information about GIDEP, see http://www.gidep.org/.

- *Weapon System Impact Tool (WSIT).* WSIT, which is part of the ASSIST database, is a DSPO-sponsored website that provides an interface to access weapons system and specification content extracted from third-party sources, including unstructured legacy information. (The quality of extracted data is measured in accordance with ASQC Q3-1998, a standard issued by the American Society for Quality.) The interface enables users to search for and view results as structured data within a single WSIT coherent view of the weapons systems environment. To access WSIT, log on to ASSIST (http://assist.dla.mil/).

Appendix A

REFERENCES

Documents

Defense Acquisition Guidebook: https://dag.dau.mil/

Diminishing Manufacturing Sources and Material Shortages: A Guidebook of Best Practices for Implementing a Robust DMSMS Management Program, SD-22, August 2012: http://quicksearch.dla.mil/basic_profile.cfm?ident_number=275490&method=basic

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"Reporting Nonconforming Products," Office of Management and Budget Policy Letter 91-3, April 1991: http://www.whitehouse.gov/omb/procurement_policy_letter_91-3

Resolution Cost Factors for Diminishing Manufacturing Sources and Material Shortages, Final Report, February 1999 (prepared by Defense Microelectronics Activity), and Supplemental Report, 2001: http://www.dmea.osd.mil/docs/resolution_cost_factors.pdf and http://www.dmea.osd.mil/docs/cost_metrics_revision1.pdf

Websites

Acquisition Streamlining and Standardization Information System (ASSIST) (does not require ASSIST login or password): http://quicksearch.dla.mil

Defense Microelectronics Activity: http://www.dmea.osd.mil

DLA Land and Maritime: http://www.landandmaritime.dla.mil/

Diminishing Manufacturing Sources and Material Shortages (DMSMS): http://acc.dau.mil/dmsms

Government-Industry Data Exchange Program (GIDEP): http://www.gidep.org/

Parts Standardization and Management Committee: http://www.landandmaritime.dla.mil/programs/psmc

Weapon System Impact Tool (WSIT) (requires ASSIST login and password): http://assist.dla.mil/

Appendix B

Parts Management Questions for System Engineering Technical Reviews and Logistics Assessments

Table 2 contains examples of questions that may be asked during the system engineering technical reviews and LAs throughout the acquisition life cycle.

Table 2. Examples of Questions to Be Addressed at Different Stages of the Acquisition Life Cycle

Item or activity	SRR	SFR	PDR	CDR	PRR	MS B, MS C, and FRP	Post IOC
Parts management plan	Is parts management required on the contract in accordance with MIL-STD-3018?	Has a preliminary parts management plan been developed?	Has a parts management plan been updated and implemented?	Has a parts management plan been updated and approved?		Is the parts management plan being maintained?	Are parts management plans for system modifications being maintained?
Parts selection baseline		Is a corporate baseline/parts selection list in place?	Is a corporate baseline/parts selection list maintained in accordance with the parts management plan?	Is a corporate baseline/parts selection list maintained in accordance with the parts management plan?	Is a corporate baseline/parts selection list maintained in accordance with the parts management plan?	Is a corporate baseline/parts selection list maintained in accordance with the parts management plan?	Is a corporate baseline/parts selection list maintained for modifications in accordance with the parts management plan?
Parts selection and authorization process		Has responsibility been established for selection and authorization of parts not on the baseline PPL for the program?	Is the selection and authorization process in place for parts not on the baseline PPL for the program?	Have all parts not on the baseline PPL and requiring approval been identified?	Have all parts been approved?	Have all parts not on the baseline PPL and requiring approval been identified and approved?	Have all parts not on the baseline PPLs for modifications and requiring approval been identified and approved?
		Has the parts selection order of preference been established to minimize the introduction of new parts and used to develop a preliminary PPL?				Has the parts selection order of preference been established to minimize the introduction of new parts and used to develop a preliminary PPL?	Has the parts selection order of preference been established for modifications to minimize the introduction of new parts and used to develop a preliminary PPL?

Item or activity	SRR	SFR	PDR	CDR	PRR	MS B, MS C, and FRP	Post IOC
		Do the parts and material selection processes and criteria ensure items satisfy the worst-case DRMP and design environment?	Do the parts and material selection processes and criteria ensure items satisfy the worst-case DRMP and design environment?	Do the parts and material selection processes and criteria ensure items satisfy the worst-case DRMP and design environment?	Do the parts and material selection processes and criteria ensure items satisfy the worst-case DRMP and design environment?	Do the parts and material selection processes and criteria ensure items satisfy the worst-case DRMP and design environment?	Do the parts and material selection processes and criteria for modifications ensure items satisfy the worst-case DRMP and design environment?
		Do the parts selection criteria account for life-cycle affordability (e.g., standardization, reliability, availability, maintainability, and supportability of parts)?	Do the parts selection criteria account for life-cycle affordability (e.g., standardization, reliability, availability, maintainability, and supportability of parts)?	Do the parts selection criteria account for life-cycle affordability (e.g., standardization, reliability, availability, maintainability, and supportability of parts)?	Do the parts selection criteria account for life-cycle affordability (e.g., standardization, reliability, availability, maintainability, and supportability of parts)?	Do the parts selection criteria account for life-cycle affordability (e.g., standardization, reliability, availability, maintainability, and supportability of parts)?	Do the parts selection criteria for modifications account for life-cycle affordability (e.g., standardization, reliability, availability, maintainability, and supportability of parts)?
Obsolescence management		Has obsolescence risk been assessed for new electronic parts as they are selected?	Has obsolescence risk been assessed for new electronic parts as they are selected?	Has obsolescence risk been assessed for new electronic parts as they are selected?	Has obsolescence risk been assessed for new electronic parts as they are selected?	Has obsolescence risk been assessed for new electronic parts as they are selected?	Has obsolescence risk been assessed for new electronic parts as they are selected?
Parts list or BOM	Does the contract require the BOM to be delivered to the acquisition activity?	Has the deliverable BOM format been defined and documented?	Has the deliverable BOM format been agreed upon?	Has the BOM been submitted?	Has the BOM been accepted?	Has the BOM been submitted and accepted?	Has the BOM for any modifications been submitted and accepted?

Item or activity	SRR	SFR	PDR	CDR	PRR	MS B, MS C, and FRP	Post IOC
Subcontractor management			Are requirements for a parts management plan being flowed down to subcontractors where appropriate (e.g., not off-the-shelf)?	Are requirements for a parts management plan being flowed down to new subcontractors where appropriate (e.g., not off-the shelf)?		Are requirements for a parts management plan being flowed down to new subcontractors where appropriate (e.g., not off-the shelf)?	Are requirements for a parts management plan associated with modernization being flowed down to new subcontractors where appropriate (e.g., not off-the shelf)?
				Have the subcontractors' parts management processes been verified?	Have the subcontractors' parts management processes been verified?	Have the subcontractors' parts management processes been verified?	Have the subcontractors' parts management processes associated with modernization been verified?
Part and supplier quality			Have parts and their supplier quality been documented for parts selection?	Have parts and their supplier quality been documented for parts selection?		Have parts and their supplier quality been documented for parts selection?	Have parts and their supplier quality been documented for additional parts selection on modifications?
				Are parts and their supplier quality being monitored?	Are parts and their supplier quality being monitored?	Are parts and their supplier quality being monitored?	Are parts and their supplier quality being monitored for modifications?
Part-level documentation procedures					Have released documents met the requirements?	Have released documents met the requirements?	Have released documents for modifications met the requirements?
Substitute and alternate part procedures	Have substitute and alternate part usage procedures been included in CM processes?	Have substitute and alternate part usage procedures been included in CM processes?	Are substitute and alternate part usage procedures being followed?	Are substitute and alternate part usage procedures being followed?	Are substitute and alternate part usage procedures being followed?	Are substitute and alternate part usage procedures being followed?	Are substitute and alternate part usage procedures being followed for modifications?

Item or activity	SRR	SFR	PDR	CDR	PRR	MS B, MS C, and FRP	Post IOC
Customer-contractor teaming	Has the customer-contractor teaming role for parts management been defined?	Are customer-contractor teaming and communication effective?	Are customer-contractor teaming and communication effective?	Are customer-contractor teaming and communication effective?	Are customer-contractor teaming and communication effective?	Are customer-contractor teaming and communication effective?	Are customer-contractor teaming and communication effective for modifications?
Counterfeit parts	Does the contract require anticounterfeit parts practices?	Has the contractor developed a preliminary anticounterfeit plan?	Has the contractor implemented anticounterfeit part procedures?	Are anticounterfeit parts procedures being followed?	Are anticounterfeit parts procedures being followed?	Are anticounterfeit parts procedures being followed?	Are anticounterfeit parts procedures being followed for modifications?
Lead-free parts	Is the lead-free control requirement defined?		Has a lead-free control plan been developed and implemented?	Is the lead-free control plan being followed?	Is the lead-free control plan being followed?	Is the lead-free control plan being followed?	Is the lead-free control plan being followed for modifications?

Notes: BOM = bill of materials, CDR = critical design review, CM = configuration management, DRMP = Design Reference Mission Profile, FRP = full-rate production, IOC = initial operational capability, MS = milestone, PDR = preliminary design review, PPL = preferred parts list, PRR = production readiness review, SFR = system functional review, and SRR = system requirements review.

Appendix C

General Information for Part and Supplier Evaluation

Information to Obtain from Suppliers

The following information is provided as a sample of the type of information that should be considered when evaluating a supplier or new product:

- General performance specifications and product information
  - Product data sheets
  - Availability of product samples
  - Purchase descriptions used by other government activities or used in commercial transactions, including commercial specifications, standards, and SOW
  - Participation with GIDEP with respect to Product Change Notices
  - Average time between model changes and practice of providing notices regarding parts inventories, upgrades, or production for phased-out models
  - Plans for handling upgrades and obsolescence
  - Types of quality assurance plans in effect (lead-free control plan, counterfeit mitigation control plan, etc.)
  - Types of quality management systems maintained
  - Length of time the product has been produced or the service provided
  - Product quality, reliability, and maintainability experience of similar user customers
  - Type of product operation—OCM, OEM, authorized distributor, broker, etc.; if not OCM or OEM, type of authorization held
  - Product warranty and return policies
  - Environmental and disposal considerations
  - Safety considerations related to the product's use
  - List of products and company services satisfying identical or similar service requirements
  - Cost drivers in the manufacture and use of the product
  - Applicable regulatory and de facto standards
- Supportability issues
  - Product quality, reliability, and maintainability experience of similar users
  - Repair parts availability and lead-times, documentation, pricing, and distribution systems
  - Customer service, installation, checkout, and user customer operation and maintenance instructions
  - Requirements and provisions for manpower and personnel
  - Competitive or sole source repair and support base
  - Training and training support requirements
  - Requirements for and availability of tools, test equipment, computer support resources, calibration procedures, operations manuals, and maintenance manuals
  - Commercial repair capabilities
  - Supplier calibration, repair, and overhaul practices and capabilities documentation
  - Supplier commitment to outyear support
  - Availability and type of technical support, customer support, and service

- Degree of technical data package availability (including legacy part support)
- Stability of current configuration and technology

- Test data
  - Hardware, software, and manpower interface issues such as human factors and product safety as experienced by similar users or customers
  - Manufacturer test results
  - Certification or test results from independent test organizations
  - Reliability and availability of test data.

Information for Suppliers

The following information may be required by a supplier in order to supply a part that will meet design requirements:

- Operating characteristics for hardware and software
- Environmental conditions for use
- Usage (e.g., fixed, airborne, tactically deployable) during service life
- Certificate of conformance/traceability requirements
- Quality and reliability assurance criteria
- Compliance requirements to standards
- Shipping restrictions
- International Traffic in Arms Regulations
- System interface or integration requirements
  - Computer language, speed, throughput, ports, memory, and expansion potential
  - Radio transmission frequency requirements and allocation status
  - Rules for government use of frequency spectrum
  - Human factors considerations
  - Open architecture requirements
- Maintainability information
  - Self-test requirements
  - Warranty requirements
  - Limitations, if any, on organizational-level support equipment
- Communications/computer system interface information
  - Software portability to other communications/computer systems
  - Operating duty cycle (e.g., 24 hours, intermittent)
  - Input power quality (drops, surges, spikes, noise)
  - Essential safety characteristics
  - Reliability, maintainability, and survivability data
  - Nuclear hardening requirements
  - Chemical, biological, and radiological survivability data
  - Electromagnetic compatibility/electromagnetic interference susceptibility.

Appendix D

Part Qualification Approaches: General Guidelines

Part qualification includes verification that a part meets all requirements for a particular intended application. This verification requires detailed knowledge of the application, such as the life-cycle environmental and operating profiles, and the failure and degradation mechanisms of the part under these conditions, in order to define the necessary data to verify qualification. The qualification data may already exist from previous tests or use in another application, or new data may be required. In either case, the acceleration factors of the failure and degradation mechanisms of test or use conditions relative to the target application use conditions must be characterized. The part qualification rationale for a particular application typically requires analysis and/or test results from multiple sources, such as part manufacturer testing, equipment manufacturer testing, and in-service use of another application. Developing the strategy for deriving this qualification rationale requires tradeoffs of various goals, restrictions, and cost.

The following list highlights some of the areas that must be considered when developing a part qualification approach:

- The data sample sizes must reflect the required reliability and confidence level for the target application.
- The part- or assembly-level data assessment must consider the environmental and operational stress conditions of the data for comparison to the target application conditions, taking into account all part failure and degradation mechanisms and their stress condition acceleration factors.
- Compared with part-level testing, higher assembly-level test data provide greater application-specific functional performance insight and verification of design compatibility with other parts. However, the test asset cost can be very high, which can limit sample sizes to the point of losing sufficient confidence in the reliability characterization.
- Using in-service data requires full characterization of the in-service environmental and operational stress conditions for comparison to the target application conditions. It also requires confirmation that in-service failures have been analyzed to their root cause at the part level to ensure that the data reflect the true performance of the part.
- In some cases, higher assembly-level design may not allow sufficient insight into a particular part's performance, so part testing should supplement the higher level testing.
- Developing test software for complex parts (microprocessors, digital signal processors, etc.) may represent the major cost in part testing. Therefore, leveraging the ability to test the parts at higher assembly levels would avoid the difficult and costly task of developing part-level test capability if the part manufacturer will not support such an effort. These parts also tend to have low frequency of use (e.g., one per circuit card assembly), which generally suggests that part-level testing would provide better characterization. These competing constraints require detailed assessment to determine the optimum approach.
- Testing at higher assembly levels requires consideration of the larger number of failure and degradation mechanisms with different acceleration factors compared to the part level, which can often require limiting test stress levels, and thus requiring very long test times, to not cause failure of assembly before assessment of lower acceleration factor failure mechanisms.

Appendix E

GLOSSARY

Alternate Part. A part that is an acceptable replacement part for a specific design application.

Common Corporate Baseline (CCB). A list of parts (standard and nonstandard) identified from among the submitted corporate baselines based upon their frequency of use within a given time frame (e.g., all parts common to two or more corporate baselines that have been submitted or updated within the last 3 years).

Corporate Baseline (CB). A list of parts approved by a corporation for use in equipment design application. The contractor creates and maintains this list.

Data Item Description (DID). A completed form that defines the data required of a contractor. DIDs specifically define the data content, preparation instructions, format, and intended use.

Diminishing Manufacturing Sources and Material Shortages (DMSMS). The loss or impending loss of the last known manufacturer or supplier of raw materials, production parts, or repair parts.

Life Cycle. The time contained in the period from the first contract award date through the conclusion of government ownership of the military system or equipment.

Part. One piece, or two or more pieces joined together, that is normally subject to disassembly without destruction or impairment of its design purpose.

Parts List. A list of all parts used in design or construction of the military system or equipment. Initially, it contains those items designed into the system. Upon production, it contains those items that are incorporated into the actual units produced.

Parts Management. The practice of considering the application, standardization, technology (new and aging), system reliability, maintainability, supportability, and cost in selecting parts and addressing availability, logistics support, DMSMS, and legacy issues in supporting them throughout the life of the systems.

Parts Management Advisory Team (PMAT). A team of program and commodity specialists at the Defense Logistics Agency supply centers who will be available (to the acquisition activity and contractor) to advise and provide recommendations on parts management plans and processes and on the selection and use of preferred (standard and commonly used) parts.

Parts Management Board (PMB). A group composed of people who represent parts management responsibilities for their individual companies. The PMB is responsible for identifying part status for inclusion in the PPL or CB.

Parts Management Plan. A contract-specific application of a contractor's corporate parts management procedures that meets the objectives of the equipment system's mission profiles, support strategy, expected service life, and DoD parts management goals and objectives.

Parts Standardization and Management Committee (PSMC). A government and industry forum that influences and supports parts management and standardization.

Potential Part. A part reviewed by the PMB and deemed not justified for use at that time although the part may have potential future usage.

Preferred Parts List (PPL). A list of parts preferred for use in equipment design, which often contains descriptions, attributes, or application information. The term is used in this document to represent the names of several different contractor and government parts lists. Examples of such lists are approved parts lists, approved parts baselines, corporate baselines, common parts lists, common corporate parts lists, parts selection lists, preferred parts lists, and program parts selection lists. These parts lists have similar purposes, but their degree of application varies from company to company and within different government acquisitions.

Preferred (Standard) Part. A standard part that by the nature of its historical usage or its future potential usage has been designated by the PMB as "standard" or preferred for use in equipment. The part shall be adequately controlled and documented by a government; an NGS body; or a company specification, standard, or drawing.

Prohibited Parts List. A list of parts deemed unacceptable by the PMB for use in a company's products because of cost, quality, safety, etc.

Substitute Parts List (SPL). A list of all approved substitute parts used in production equipment. SPLs are typically established by program or project, as the viability of a substitute part is determined against specific application requirements. Substitute parts are used instead of an equivalent part listed in the PPL and the BOM, and are typically used on a limited basis.

Appendix E

ABBREVIATIONS

ASSIST	Acquisition Streamlining and Standardization Information System
BOM	bill of materials
CAD	computer-aided design
CB	corporate baseline
CDRL	Contract Data Requirements List
CID	commercial item description
CM	configuration management
DAG	*Defense Acquisition Guidebook*
DID	Data Item Description
DLA	Defense Logistics Agency
DMSMS	Diminishing Manufacturing Sources and Material Shortages
DoD	Department of Defense
DPMP	Defense Parts Management Portal
DRMP	Design Reference Mission Profile
EMD	engineering and manufacturing development
FLIS	Federal Logistics Information System
GIDEP	Government-Industry Data Exchange Program
IOC	initial operational capability
IPT	integrated product team
LA	logistics assessment

NDI	non-developmental item
NGS	non-government standard
NIIN	National Item Identification Number
OCM	original component manufacturer
OEM	original equipment manufacturer
OTS	off-the-shelf
PMAT	Parts Management Advisory Team
PMB	Parts Management Board
PMP	Parts Management Program
PPL	preferred parts list
PSMC	Parts Standardization and Management Committee
SE	systems engineering
SMD	standard microcircuit drawing
SOO	statement of objectives
SOW	statement of work
SPL	substitute parts list
WSIT	Weapon System Impact Tool

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