

Parts Management in Systems Engineering

By Dan McLeod and Jay Mandelbaum



Parts management is a design strategy that seeks to minimize the number of unique or specialized parts used in a system (or across systems) to reduce the logistics footprint and lower total ownership costs. As part of the engineering process, parts management is an integrated effort to streamline the selection of preferred or commonly used parts during the design of weapons systems and equipment within an overarching systems engineering (SE) framework. Typically, preferred parts are those described by non-government standards or military standards, or parts already in use in the DoD supply system. This process determines optimum parts while considering all factors that may affect program outcomes.

Parts Management

Parts management is 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, Diminishing Manufacturing Sources and Material Shortages (DMSMS), and legacy issues in supporting them throughout the life of the systems.

It is important to understand what part types are being addressed by the parts management program. The term “part” could denote different hardware levels, depending on how the term is used. In the context of a parts management program, these part types are *one or more pieces joined together, which are normally not subject to disassembly without destruction or impairment of their intended design use*. Microcircuits, connectors, resistors, capacitors, fasteners, bearings, valves, screws, and rivets are some examples of these part types. They are the building blocks from which systems are created and, as such, greatly affect hardware dependability and readiness. Because the reliability and maintainability of the end item is dependent upon these building blocks, the importance of selecting and applying the most effective parts management program cannot be overemphasized.

If parts management sounds like an important acquisition engineering design consideration, it is, especially in today’s acquisition environment characterized by rapidly changing designs and technologies and by increased risk to DoD weapon systems and equipment due to issues with parts that affect reliability, standardization, and supportability. Parts management takes on even greater importance in the overall defense environment—affordability. In remarks delivered in Abilene, KS, on May 8, 2010, the 65th anniversary of the allied victory in Europe, Secretary of Defense Robert M. Gates highlighted the importance of affordability:

As a matter of principle and political reality, the Department of Defense cannot go to America’s elected representatives and ask for increases each year unless we have done everything possible to make every dollar count—unless there is real reform in the way this department does its business and spends taxpayer dollars.

DEFENSE MANAGEMENT REVIEW AND ACQUISITION REFORM

In the 1980s, parts control was a mandatory requirement for major acquisition programs. (At that time, the program was “parts control” and not “parts management.”) Over time, the parts control requirement and its enforcement became overly prescriptive, burdensome, and costly for many programs. In 1991, under the Defense Management Review, the regulatory requirement for parts control was eliminated. Parts control became a discretionary practice for major acquisition programs. In 1996, under Acquisition Reform, the parts control military standard was canceled and superseded by a parts management guidance handbook.

The well-meaning intent of eliminating both the policy mandating parts control and the parts control military standard was not to eliminate the need for effective parts management, but to free the program office and contractor from what was perceived as an overly prescriptive process and allow them to make “smart” decisions. The message that was supposed to be sent was that we want to replace a cumbersome, costly, and time-consuming “parts control” process with an agile “parts management” process that achieves specified performance outcomes to optimize system performance and supportability throughout the life cycle. Unfortunately, the unintended consequence of eliminating the requirement and method for parts management was that many programs stopped addressing any form of effective parts management.

PARTS MANAGEMENT REENGINEERING

In March 2004, DSPO established an ad hoc committee of government and industry representatives to reengineer parts management. This effort revealed that parts management lacks discipline and is decentralized and underfunded. Moreover, responsibility for parts management is widely spread and poorly defined, which limits its value to DoD. The committee recognized that realizing the full potential of parts management would require fundamental changes involving several organizations. The needed changes would improve interoperability, increase operational availability, shorten system development time, and reduce the logistics footprint and total ownership cost.

After studying the situation and identifying problem areas, the ad hoc committee published recommendations to significantly improve defense parts management. Two of the most important recommendations were to

- make parts management a policy and contractual requirement and
- revitalize parts management within the systems engineering discipline.

These recommendations are interconnected, because systems engineering is the area responsible for the parts management contractual requirement.

Systems Engineering

Parts management is an SE design consideration. Selecting the right parts is fundamental to achieving many SE and manufacturing objectives, and it influences cost, schedule, and performance.

To implement the committee's recommendations, DSPO collaborated with the SE community to craft and reintroduce parts management language into SE policy, guidance documents, and training. The response was very positive, because systems engineers are acutely aware of the importance of using optimum parts in design. The Parts Standardization and Management Committee (PSMC) is responsible for implementing strategies for carrying out the recommendations for reengineering parts management. The PSMC is a DSPO-chartered government and industry forum that influences and supports parts management and standardization.

The PSMC, with strong systems engineering participation, has made significant progress concerning the recommendation for parts management in the policy and contractual requirement area. MIL-STD-3018, "Parts Management," and an associated Data Item Description, DI-SDMP-81748, "Parts Management Plan," have been developed for contractual implementation of parts management requirements. DSPO published SD-19, *Parts Management Guide*, to provide government and industry managers a pragmatic approach to parts management that will enhance weapon systems operational and logistics readiness and will reduce the logistics footprint and total ownership cost. When used with MIL-STD-3018, the guidance in SD-19 will help ensure successful parts management to support current acquisition strategy. A directive memorandum that would require weapon systems and equipment acquisition contracts to address parts management is being considered.

Progress also has been made concerning the revitalization of parts management within systems engineering. A recent event that will help ensure success in this regard was the transition of DSPO to the Mission Assurance team of the Office of the Director, Systems Engineering. This is a good fit because the parts management discipline is now in the same specialty engineering group as several related disciplines: reliability, availability, and maintainability (RAM); supportability, quality, and manufacturing and producibility; DMSMS; and value engineering/reduction in total ownership cost. In addition to having a direct positive impact in these areas, parts management will contribute to the overall SE mission in the risk identification and management and the life-cycle focus areas.

Systems engineering's representatives on the PSMC identified four goals for revitalizing parts management within systems engineering:

- *Ensure parts management is adequately reflected in SE policy and guidance.* Recent accomplishments include the addition of parts management language in *Defense Acquisition*

Guidebook, Chapter 4, “Systems Engineering,” Section 4.4.12. Other key SE policy, contractual, and guidance documents are under review for potential inclusion of parts management language.

- *Conduct outreach on the importance and benefits of a proactive parts management approach.* Among the accomplishments in this area are presentations at PSMC conferences; development of a Defense Acquisition University course (CLL206, Parts Management Executive Overview) as a continuous learning module; parts management training, SE presentations, and discussion panels at the annual DMSMS and Standardization conference; and journal articles. Opportunities going forward in this area include presentations at conferences hosted by industry associations; the Office of the Director, Systems Engineering; the Office of the Under Secretary of Defense for Acquisition, Technology and Logistics; and service program executive offices and systems commands.
- *Build on the parts management relationship to RAM.* This goal should not be difficult to accomplish, because the relationship between RAM and parts management has always been strong. RAM guidance documents address some form of parts management or part selection, but the verbiage needs to be strengthened and updated.
- *Exploit parts management contributions to manufacturing readiness.* This goal needs further review to determine how best to address parts management considerations.

Although much work remains to be done, the DoD parts management program is now under the optimal organization for accomplishing these SE goals.

Conclusion

One cannot overstate the importance of systems engineering—and the specialty engineering disciplines associated with it—to successful, cost-effective acquisition. Parts management contributes to the overall SE mission in the risk identification and management and the life-cycle focus areas. 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. The time is right for parts management to be emphasized in the SE area. The PSMC will continue to address SE parts management initiatives with help from the SE and parts management communities. To be involved in this effort, please contact DSPO’s Donna McMurry at Donna.McMurry@dla.mil or 703-767-6874.

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