# Top 10 Equipment Design/Build/Repair Process Selection Require Common Perform/Support Parts Standards

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Marine Corps fleet of MV-22 Osprey is being reduced from more than 70 distinct variants to about five so the service will increase commonality throughout the Osprey fleet. These efforts will boost readiness through simplifying the maintenance efforts on the planes, while also generating savings in dealing with parts suppliers and making operations easier on pilots and maintainers.

Since Osprey production began in 2004, the Marines have continued to insert reliability and capability improvements into the production line – which not only incurs a cost on the acquisition side, but has made maintenance, operations and logistics a headache. Even within squadrons, pilots and maintainers have had to work with different configurations that have wires and switches in different places, have different mission capabilities, and require different spare parts.

Common Parts Catalogs present viable, robust solution to problems currently facing Build/Repair Job Site parts component operations. Through new device applications, there are now standard techniques that can extend the capabilities of parts catalogs. Integration of parts catalogs can now be done with material design/requisition applications.

Application teams are leading the way to many significant efficiencies for the processes of parts handling. The implementation and adoption of standards function as key component in larger integration efforts of Job Sites and functions as critical base for the one-Job Site concept.

Means of standardising and organising parts catalogs at Job Sites has become a crucial step in advancing useful communications between DoD and suppliers. From the extremely outdated method of parts tracking and cataloging on paper, to the latest available modern applications, efforts aim to alleviate problems encountered in executing disparate Job Site tasks. DoD must critically evaluate current parts cataloging system and replace it with a highly organised and flexible application structure to keep track of parts and materials.

Parts are the building blocks from which weapons systems are created and, as such, greatly impact factors critical to field-level missions such as dependability, readiness, and operating costs. Parts teams must establish practice of considering the application, standardisation, technology, system reliability, maintainability, supportability, and cost in designing or selecting parts and addressing availability and logistics support over service life of equipment. Because the reliability and maintainability of  end items are dependent upon these building blocks, the importance of selecting and applying the most effective application for tracking parts cannot be overemphasised.

Selecting, specifying, ensuring proper design applications for tracking parts used in complex

systems constitute a major engineering task to include selection of preferred or commonly used parts during the design of weapons systems and equipment. Typically, use of parts described by military standards or the use of commonly used parts already in the DoD supply system is preferred unless business case assessments show new unique parts would have significant impacts on service life costs or other advantages.

Regardless of the actual means of tracking parts information, the largest problem that became compounded through the years was the lack of a standard practice or, where there was one, lack of dissemination of that standard to those who would need it. Many years of operations with many different users resulted in user-specific parts descriptions subject to user technique preference at the time the part was entered. Users could quickly expedite operations, but the lack of standardised formats make retrieval and manipulation of useful information almost impossible.

An important element of parts tracking applications is feedback. Engineers must have feedback from all the functional areas to ensure standardisation requirements are meeting the objectives of the parts tracking plan. Sources of feedback information include subcontractors, quality deficiency reports, customers and suppliers. Establishing smart parts teams practices must include periodic adjustments based on information and experience acquired from initial design all the way through production and sustainment, also feedback to include design engineering, purchasing and manufacturing phases.

Additional work is necessary to push the system out to vendors and design agents. Job Site Teams envision a system where vendors will upload their part information to a central repository, which the end-user Job Sites and design agents can access for downloading. The One-Job Site concept could soon be reality, at least with regard to material definition and information technology systems.

The most basic unit in Job Site build/repair processes is the separate part entities, so application design must deal with key physical traits of parts. Material requisition systems are concerned with parts vendors and timetables to acquire parts. Scheduling systems ensure parts are ready for build process at the correct times to maximise efficiency. Purchasing systems keep cost and vendor information, while inventory systems keep track of the in-stock quantities of a part.

All these systems deal with the same key component: single parts. Consideration as single part entity despite their complexity is an important concept in the process of integrating many different systems. With clear standardised methods of identifying and classifying distinct parts, barriers to achieving systems integration begin to break down.

Maximum flexibility in the part descriptions requires capability to handle extraneous information not effectively utilised within current structures. Often there are parts with information that can be shared between them as well as certain tracking documents that may relate to the part for certain purposes, but not for others. For many parts, extraneous information is not effectively covered in current systems, the most obvious example upon inspection is part material designations. Attributes for material type exist, but often there are grades and standards associated with a particular type, as well as certifications that are not attributes.

Contract specifications, material grade standards and certifications do not readily lend themselves to placement, but are important aspects of each part. Defining and tracking update descriptions in separate sections provides for part association, allowing for greater flexibility and optimisation.

Reliability and maintainability engineering have a direct impact on both mission capability and cost over the service life of equipment ensuring the parts selected meet contractual requirements and proper design application is critical to ensuring requirements and acquisition contracts for weapons systems are met. Part selection process reduces use of parts with known built-in failure mechanisms, resulting in enhanced reliability and maintainability.

Standardisation reduces proliferation of part types used in system designs and is important for enhancing material readiness and interoperability and for reducing total ownership costs. Selecting standard or commonly used parts ensures that reliable contracting of part types reduce design risks.

Use of standard or commonly used parts within and across DoD weapons systems and equipment enhances inter/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 instances of part supply line termination.

Part and supplier qualify is an important requirement for selecting parts 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 suppliers who provide the selected part must be required to follow documented and established quality assurance policies and procedures.

Quality assurance policies and procedures should include, for example, quantify process controls on manufacturing, material, shipment, storage, notification concerning process changes and field-level customer satisfaction. It is easy to understand why disciplined part selection processes in the design phase, as part of a formal assessment increases the probability of using the most optimum parts in DoD weapons systems and equipment.

Parts teams establish basis for maintaining parts baselines and includes 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.

Also, parts administration determines the extent to which there is a reliance on commercial products and the potential methods for dealing with future parts design changes driven by the commercial marketplace. Parts teams support the planning processes throughout all manufacturing phases.

Standardisation limits the introduction of new parts, which enables consistent and efficient methods for manufacturing planning and support. Parts teams ensure the facilitation of manufacturing support systems and processes such as material requirements planning. In the

operations area, parts teams consider several supply line issues operational support.

Design teams evaluate 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.

Parts teams ensure standardisation is taken into account to minimise costs e.g., maximise the use of parts already being used elsewhere. It also identifies the funding needed to perform the activities necessary to determine the part will work as intended.

Reduced acquisition lead-time .is a factor when a preferred part is used, DoD and suppliers can frequently avoid the expense and delay of designing new parts, 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 purchase request and receipt of the parts.

Parts teams ensure material selection processes account for special handling and assess selected parts for availability, evaluates them to mitigate future effects of not being available, and establishes processes to minimise the use of incompatible components, materials, and processes. Parts teams ensure qualification considerations have been properly addressed by identifying and performing tests and assessments.

Process capability and control teams efforts ensure high degree of understanding exists of the consistency of the design to manufacturing processes establish processes are sufficient to satisfy the system requirements. It also provides for special design considerations-- for example, making sure product performance meet system requirements.

Parts teams ensure quality requirements have been tailored for different commodities. It recommends part failure assessment approaches, determination of the root cause of failures, identification of failure effects on performance, and corrective action accountability. Also, parts teams establish proper controls to avoid the introduction of defective parts as a result of schedule and out of date conditions.

An important factor in selecting quality parts suppliers 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 must address both quantification of process control and the implementation of process controls on manufacturing, material, shipment, storage, process changes, customer satisfaction, and quality assurance.

Enhanced logistics readiness and interoperability is achieved when assemblies or systems share common components, repair time is shorter, because parts are more likely to be in the supply line. Using common components simplifies logistics support and enhances ability to substitute because fewer parts need to be stocked. This translates into savings in procuring, testing, warehousing, and transporting parts.

Increased supportability leads to selection of the right parts to 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 compromise success of critical missions.

1. Part Ownership/Description

Spare Parts naming has always been a challenge, from the lack of description standardisation among parts manufacturers to systems classification templates being configured by individual users.

2. Part Revision/Replace

Version and revision team action ensures on-site replacement parts are ready for use when you need them

3. Special Condition/Action

Time for action conduct physical evaluation to see the real condition of spare parts and remove obsolete items from storage at same time

4. Type Modifier

Part item order modifiers ie, fixed lot multiplier are used for establishing sourcing scenarios.

5. Material Commodity

Direct materials are services or commodity purchases forming part of a finished product.

6. Size/Capacity Rating

Replacement parts can be ordered individually, but if difference in size between like parts is small, mistakes can occur when interchanged.

7. Unit of Measure Issue

When a non-definitive unit of issue is assigned to the stock item, it may be further quantified by a unit of measure and measurement.

8. Make/Buy Source Lead Time

Latency between the initiation and execution of a process, for example, the lead time between the placement of an order and delivery of spare part from a manufacturer

9. Shared Part Inspect Override

Default inspection site identified for an item is used as the putaway location at the time of receipt, unless an overriding assessment is specified

10. Part Tolerance

Quality of materials, precision in assembly and high tolerance level for entire design are essential elements to guarantee durability of any component