COMMERCIAL PARTS - NOW, LATER, OR NEVER

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Events of the past few years have forced government contractors to exert greater efforts on reducing their cost of operations. Cost for materials has naturally been one of the principle areas of concentration. Many contractors have concluded that these costs are needlessly high because of the government's insistence on using military type parts. A strong movement is, therefore, afoot to promote greater use of commercial parts. Papers have been circulated extolling their advantages; speeches are being made by political, business, and military leaders suggesting serious consideration be given to using available off-the-shelf type equipment and contractors are dismayed that requirements to use military type parts still exist.

On the contrary, we have seen or heard very little on the virtues of using military type parts. Maybe too many people have just taken it for granted that nothing need be said since this is just the way it has been for as long as most of us can remember. Manufacturers have innumerable facts about their products and can be expected to cite their advantages; however, only one government organization is actively gathering information on or promoting the use of military parts. Procurement Officers leave it to the specification writers and the specification writers are reluctant to change for a number of reasons that will be explained later. Also, no one group or organization within the government or private industry can possibly know the full cycle of operations, costs, maintenance tasks or support operations involved in all the types of standard parts. As an example, a standard relay is used in a diversity of applications, branches of service, and environmental conditions in the U.S. and foreign countries. We, at NAVTRAEQUIPCEN, may know how this relay is used in training devices, but not on other applications by other activities. It would help to have an unbiased thorough evaluation of each part as to why it is used, how it is used, who uses it, and what standards must be met for each application. However, the whole purpose of using military type parts is to avoid such costly studies and allow parts to be selected with full confidence that they will meet stated characteristics.

A requirement for a new approach is apparent. Conditions are changing and the government is lessening its resolve to stick wholly to military type parts. The wedge is economics and the necessity to obtain as much as possible for each obligated dollar. It is extremely difficult for procurement officials to explain why a contract did not go to the low bidder, and contracts with design-to-unit-production-cost clauses rely heavily on low acquisition costs. More and more commercial parts are creeping into government inventories.

This paper will present no startling new theories, no facts previously unknown to man, and no recently discovered data sources. However, we will try to present some basic reasons why the government does specify military type products, what efforts are underway that may offer some reasonable solutions and what changes we may expect in the future.

Cost Considerations

Since the heart of the problem is connected to economics, let us first examine the cost situation. One of the problems is that the pro-commercial users tend to concentrate on the initial or acquisition cost of these products and may not be fully aware of possible later consequences. The government is actually moving more and more to an analysis of the ultimate or life cycle cost as the prime consideration. Unfortunately, data on other than acquisition costs usually does not exist in a readily available data bank or cannot be acquired in the desired format.

Maintenance costs are a very serious problem for the DoD. Maintenance and operational costs account for over 70% of the 1978 budget. Such costs can easily be ten times the acquisition costs for the life of a training device. The DoD is already desperately seeking an inexpensive solution to this expensive problem.

Commercial parts place a heavier and possibly unnecessary burden on maintenance costs because they require special treatment in so many instances. First of all, they require that another

item be carried in inventory; they frequently require special tooling or test equipment over and above what is presently available; they require separate handbooks, manuals, and parts catalogs; they require individualized training of personnel for operation and maintenance and may require unique methods for processing parts, handling and storage. All of these factors, plus others, should be considered when evaluating whether it is cost effective to use a commercial part or not.

As an example, we will evaluate a few of the more basic cost factors such as cost of repair and cost of establishing and maintaining an inventory. Perhaps just these few costs will give us some indication of the magnitude of the total cost involved.

It will help to first make some assumptions. Let us accept the MIL-HDBK-217 statement that a high-reliability standard part is twenty-five times more reliable than a commercial part. To be realistic, we will reduce this factor to 10 to 1, since all standard parts will not be of the high-reliability type. A rough estimate of a weapons system trainer is that it may include 50,000 parts. Suppose, we assume also that only 1/10 of these presently military type parts become commercial parts and each of these parts are used 2½ times/device, making a total of 2,000 different items. Average part cost will also be taken as $1/part for commercial parts and $3/part for military type parts.

Some other standard cost figures that we may use are: $200/item entry cost into the federal inventory, $150/item/year inventory maintenance cost and $20/hr. labor cost.

We also will assume that a standard part fails once every ten years. Therefore, with the assumed failure rate, we would have ten failures of the commercial part, or one per year. The cost of the commercial failed parts would be 5,000 parts x 1 failure/yr x 10 yrs x $1/part or $50,000. The military part would cost 5,000 parts x .1 failure/yr x 10 yrs x $3/part or $15,000. Labor costs for ½ hr/repair of commercial parts would be 5,000 x 1/year x 10 yrs x ½ hr x $20 hr = $500,000, while it would be only 1/10 as much or $50,000 for the higher reliability military type part.

The difference in inventory cost would be even greater. This is because there is really no requirement to maintain any inventory on any commercial part that has an interchangeable military type. One of the primary benefits of standardization is really to stock only those items with the most applications in order to decrease the variety of items that must be maintained in inventory. Therefore, using our prior assumptions, as applied to 2,000 different types of parts that would not be in inventory if military parts were used, we find that we have burdened the government with 2,000 parts x $200/part entry + 2,000 x $150/yr x 10 yrs = $3.4 million over a 10 year life cycle.

The difference in cost for just these few considerations is a whopping $3,885,000 over a 10 year period.

We will grant that different assumptions can be made and different results might be obtained. However, our interest is merely to illustrate a few of the costs of some necessary government support functions that are normally not included by suppliers when evaluating military type parts versus commercial part cost factors. More functions could be evaluated, but just these few illustrate what a tremendous amount of tax dollars are at stake.

Qualification Testing

The objective of using military type parts is to attain higher reliability, greater durability, and maximum versatility. Characteristics enhancing these objectives are designed into military type parts and the parts are then subjected to extensive qualification testing to assure that they comply to these required design characteristics. Unfortunately, this testing is expensive and the cost must be added to the cost of the part. Contractors must, therefore, pay a little more to get the assurance that the part has better quality, dependability and performance. Prior testing of commercial parts varies and it can be inconsistent, limited to selected characteristics and usually is not conducted by an impartial and independent testing laboratory.

Delivery Problems

Another objection to military type parts is the extended delivery time. Delivery could take two to three times that required for commercial parts. Six months is not considered abnormal; however, this does not apply to all parts. The contractor's procurement people already know which types of parts require extended delivery times and measures can be taken to design in and procure the long-lead items early in the procurement cycle. Problems should only occur when design changes

must be made and new parts ordered or when requests for waivers to use nonstandard commercial parts are submitted for approval too late in the life of the contract. Preliminary in-plant testing is expected to cause some design revisions, but delays in submitting the RFW's should not occur and can be very costly to the contractor.

Suppression of Innovative Design

The American manufacturer has long been characterized as being ingenious and expected to use innovative ideas in his designs. Commercial parts manufacturers claim that standardization and the requirements to use military type parts suppresses the contractor's ability to be innovative. These requirements may delay the innovative designer, but should not suppress his ingenuity. Innovative parts can always become qualified as "Standard" parts, but it does take some extra effort for specification writing and testing. Manufacturers frequently fail to recognize that there are advantages to being listed on a qualified product list. The delay and difficulties encountered by conscientious contractors is recognized by the DoD and solutions are being sought to shorten the cycle between drawing board and QPL. Some of the more promising approaches will be explained later in this paper.

Part Obsolescence

An advantage of military type parts that is mentioned only occasionally is that they are much less likely to be declared obsolete and no longer available as replacement parts. Sources of supply of commercial parts are frequently limited or sole source. The government is often left without a source when a small manufacturer goes out of business or just decides that a model is no longer profitable to produce. Commercial parts also tend to be unavailable as direct replacements as time progresses. Several generations of a particular commercial part can come into existence in a ten year span. What started as minor improvements can progress to the point where the eventual part only slightly resembles the original part. Direct part for part interchangeability then becomes difficult. When replacement parts are no longer interchangeable or become unavailable, the government inventory procuring activity is not equipped to make a major redesign effort to accept substitute parts. It then becomes necessary to take the system out of operation, send it to a contractor and issue a contract to redesign, refurbish, and modify the device to accept presently available parts. True, refurbishment is necessary at some time, but obsolete commercial parts hasten the time when this becomes necessary. It is not unusual to pay almost as much to modify/refurbish a device as it originally cost.

Part Warranties

An approach under consideration is to have commercial parts manufacturers offer warranties on their products. Surely, it is suggested, a warranty is better than a qualification test. This option may be easily applied in private industry, but not in the government where it is very difficult to control and can be very expensive in time and money. To begin with, out of the 50,000 parts mentioned before, possibly a maximum of 500 could be parts where a manufacturer's warranty may be applicable. Some of these may have warranties and some may not. Warrantied parts must be clearly marked or users will not even be aware that the parts can be returned for repair. The time cycle for removing the parts, making out paperwork, sending the part back to the manufacturer, and possibly waiting months for the repaired part to wend its way back through the necessary channels will tempt local maintenance crews to attempt local fixes. This will cause unnecessary repair costs (although unauthorized) and could result in loss of warranty due to tampering. Even if strict orders prevented this, what incentive is there for the manufacturer to observe a fast turnaround. An extended return cycle can only be countered with an extra quantity of spares on hand. This again would result in increased cost to the government.

Present Trends

Many activities are presently seeking the optimum approach to the military versus commercial parts question. The government is open to suggestions and trying to be flexible. To begin with, many commercial subsystems are already being used. The requirement for computers and peripheral equipment had a lot to contribute to this trend. The government recognized that such equipment is undergoing almost daily change. Improvements are being made literally overnight. It was a case of accepting a costly outmoded design or buying an item that represented the latest state-of-the-art, possibly at a significant cost savings. Each item (or subsystem) of considerable value is now evaluated in light of total cost and its ability or potential for being supported. The government is considering training, provisioning, tools and test equipment, maintainability, inventory expense, manuals and handbooks, the support process

itself, and the availability, qualification and cost of personnel. This evaluation concept has resulted in a significant increase in commercial type equipment being used in training devices. Major assemblies or subsystems can support separate provisions for manuals, training and support, but individual components such as integrated circuits, resistors, switches, lamp assemblies and other assorted items can not.

The sister Military Parts Control Advisory Groups (MPCAG) set up by the DoD offer great promise in several areas. The more senior organization, the Defense Electronics Supply Center (DESC) has made many contributions in the coordination and preparation of specifications, arranging QPL tests, reviewing requests for waivers and attempting to make the process of using military type parts easier, quicker, and more consistent. The other MPCAG, the Defense Industrial Supply Center (DISC) has until recently concentrated on hardware and fastening devices, but is now widening its vistas to include other mechanical type items. DESC has considerably shortened the evaluation process in reviewing requests for waivers. Individual telephone inquiries can provide same day service. A list of ten to twenty items will generally require only five to seven days for a written response with recommendations. DESC does not restrict their recommendations to only military type parts. They recommend "preferred" type parts. These could be preferred commercial parts, selected from the available nonstandard type parts, or preferred military type parts where several military types are available. Their experience in reviewing specific parts and their excellent staff of specialists in various categories have resulted in activities of all three services using the same preferred high quality parts. Where there is a demand for a commercial part and no standard exists, DESC will prepare a specification and coordinate the necessary arrangement for QPL certification. This has significantly shortened the time cycle for converting many nonstandard parts to standard military type parts.

The proposed MIL-STD-965 is another case where the DESC has taken steps to assist the contractor. It proposes that a preliminary conference be held very early in the contract life between representatives of the contractor, DESC, and the procuring activity to establish which types of proposed parts will be acceptable and which types should be avoided. This removes much of the uncertainty on the part of the contractor on which types of parts should be used, which are available and which will require long lead times. This early clarification of parts criteria will possibly avoid some later redesign or reprocurement costs.

MIL-STD-749 is the standard document used to detail how a contractor can request a waiver to use a nonstandard part. This document specifies all kinds of extra requirements and added costs to the contractor if he wants to use a nonstandard part. The full application of MIL-STD-749 could cost the contractor more to use a nonstandard commercial part than to use an approved military type part. The emergence of the MPCAG's has allowed DoD activities to accept the MPCAG recommendation without requiring the preparation of full specifications and test data. The submission of a page from a vendor's catalog is frequently sufficient for approval since DESC or DISC is usually familiar with the part and its characteristics.

We may eventually see manufacturers submitting their commercial products to a government activity for preparation of specifications, testing, and qualification. Testing costs will probably still be borne by the manufacturer and will be similar for competitive products. Specification costs may be borne by the government for items meeting some established criteria. Alternate sources of supply must continue to be encouraged for obvious reasons.

The application of Logistic Support Analysis to some of the more recent contracts offers an interesting new source of data that may be helpful in future comparisons of military versus commercial parts.

There is no doubt that lack of data makes an evaluator more cautious and the inclination is to resist change and stick with what is familiar - in this case, military type parts. Therefore, it has been usual practice to specify the military parts and make the manufacturer supply the burden of proof that a commercial part is completely adequate for the application. New data on repair time, frequency of repair, labor costs, tool costs, and inventory costs will now become available on reparable items from LSA data. Some of the mystery of cause and effect of commercial parts will be removed.

Conclusion

Commercial parts will make an ever increasing contribution to the simulation industry. This industry demands innovations and commercial parts provide a

flexibility to meet these needs that does not exist in all military type parts. Commercial parts are usually less expensive to procure, some effectively provide functions not available in military type parts, and they will always be the technical leaders in advanced designs.

There are advantages and disadvantages to military type parts just as well as there are to commercial parts. We can not afford to disregard standard parts or ignore commercial parts. There is a proper place for each, but we must find out which one fits which niche. My concern is primarily to make you and other decision makers conscious of the need to consider all facets before any expensive mistakes are made. Private industry, the government and all of us as taxpayers, can ill afford costly errors of judgment at this time.

Much work still remains to be done. The guesswork must be eliminated and the evaluation process simplified. We need better data, new guidelines and procedures, life cycle costing criteria, better controls on and knowledge of part applications and universal industry standards for commercial parts.

It's going to take a concerted effort by the government and private industry. Work groups and committees must be established to develop facts, data, and direction and new policies implemented. It can't be done by individual activities or companies. It affects too many people, too many operations, and too much money. It must be done initially at the policy level.

The government is very fortunate that many commercial parts are available and functionally comparable, and in many cases interchangeable with military type parts. Commercial parts will always have a market and the government will be part of that market. The government's share of the market is growing and will continue to grow. Some commercial parts can almost be considered as standards now, others may never meet the criteria for government use. However, if a commercial part is good enough and used in enough applications, it will eventually evolve into a military type part and this should happen a lot quicker in the future than it does now.

ABOUT THE AUTHOR

MR. FRANKLIN W. ROZELL has been the standardization administrator at the Naval Training Equipment Center for the past four years. As such, he is charged with the responsibility for coordinating the review and evaluation of all contractor requests for waivers to use nonstandard parts as well as developing and maintaining a standardization program compatible with NAVTRAEQUIPCEN, Navy and DoD policy and requirements. He is a practicing maintenance engineer and is currently also the value engineering program manager. He has worked for the Navy for the past 14 years, the last 12 for the Naval Training Equipment Center. His previous experience has included 13 years in private industry as buyer, production engineer, design engineer, and field service representative to the U.S. Navy. Mr. Rozell received his M.S. degree in management from Rollins College and his B.E. degree from Syracuse University. He has taken courses at Lehigh University, Adelphi University, and attended various DoD-sponsored courses. He is a member of the Society of Logistics Engineers and has served in several executive positions in the Society of American Value Engineers.