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AIR UNIVERSITY

WILL COMMERCIAL SPECIFICATIONS MEET OUR FUTURE
AIR POWER NEEDS?

by

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Contents

	<i>Page</i>
DISCLAIMER	ii
LIST OF ILLUSTRATIONS	v
PREFACE	vi
ABSTRACT.....	vii
INTRODUCTION.....	1
NEED FOR ACQUISITION REFORM	4
The Defense Industrial Base.....	4
DOD And The Electronics Market.....	5
Acquisition Reform	7
MILITARY SPECIFICATIONS AND STANDARDS	10
Origin Of MILSPECs	10
Purpose Of MILSPECs And MILSTDs	10
MILSPECs Pertaining to Electronics	12
Problems with MILSPECs and MILSTDs	15
COMMERCIAL AND PERFORMANCE SPECIFICATIONS.....	19
What is a Performance Specification?	19
What are Nongovernment Standards?	20
Concerns of Using Performance and Commercial Specifications	21
IMPLEMENTING MILSPEC REFORM	25
Service Implementation.....	25
Examples Of MilSpec Reform	27
Document Infrastructure.....	28
Industry's Role	29
WHERE DO WE GO FROM HERE?	31
Benefits and Risks.....	31
Research	32
Training	33
Metrics.....	33

Flexibility Of The Specification Used.....	34
BIBLIOGRAPHY	35

Illustrations

	<i>Page</i>
Figure 1. Role of MILSPECs	14

Preface

With the decline in procurement dollars for the Air Force it is imperative that action be taken to acquire our weapon systems at the lowest possible cost while still acquiring effective systems using the latest technologies. This paper addresses one approach of reforming the acquisition system by using performance and commercial specifications vice military specifications. This paper addresses how this reform effort must be carefully managed to be effective.

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Abstract

To meet today's National security challenge, the Air Force must maintain its technological superiority by using and maintaining a strong industrial base. The Air Force must do this in an environment of declining defense spending and rapidly paced development of key technologies in the electronics market. In order to meet this challenge, the Air Force must reduce its acquisition costs and remove any barriers to ensure greater access to the latest commercial technologies. On 29 June 1994, Secretary of Defense William Perry issued a memorandum that gave preference to performance and commercial specifications over Military specifications (MILSPECs) and standards (MILSTDs). While the intent of the memorandum is good, its implementation has been overzealous with the banning of MILSPECs with no regard for the phase of the acquisition, performance information or whether a commercial specification or standard is available. The Air Force must carefully manage the use of specifications and standards, be it military, commercial or performance, to ensure access to the latest available technologies while still obtaining a quality product, at the lowest possible cost, that will be supportable in the field.

Chapter 1

Introduction

The United States Air Force, along with the entire Defense of Department, faces a new set of political, economic, and military challenges as we prepare to move into the 21st century. Though the requirements to maintain technological superiority and readiness remain constant, the circumstances have dramatically changed. Defense spending has declined in real terms by over 40% since 1985; while procurement spending has been reduced by 70%. The Air Force's procurement spending has gone from one-half of its total budget to about one-third.¹ This decline in procurement spending has resulted in a shrinking defense industrial base. At the same time, technology, driven by commercial markets, is evolving at a rapid pace. The electronics industry is of particular concern as more than 50 percent of DOD's budget is involved with research and development, production and upgrade of military equipment supplied by the defense electronics industry.² However the growth of commercial technology advancement in this sector far exceeds DOD sponsored technology efforts. The design cycle for commercial technology is approximately 3-4 years, in DOD it is 8-10 years³. Many DOD systems are technologically obsolete by the time they are fielded. To survive in this environment, the DOD needed to reform its acquisition practices. Dr. William Perry, Secretary of Defense, outlined this need for change, with dual-use technologies, use of

commercial equipment, and sharing defense technologies as ways of establishing a national industrial base which preserves core defense technologies and reduces cost of acquisition.⁴

One of the most important steps taken by DOD to increase access to commercial suppliers and products is to move to greater use of performance and commercial specifications and standards. On 29 June 94, Dr. Perry issued a directive that outlined a preference for performance and commercial specifications over military specifications (MILSPEC) and military standards (MILSTD).⁵ This directive recognizes that some MILSPECS are unique and allowed for a six month transition period for implementation. While MILSPEC reform is both well defined and intentioned, the implementation by the Services has been overzealous and not properly managed. In most cases, MILSPECS are being banned immediately, without regard for their purpose, the system's acquisition life cycle stage or the existence of a commercial specification.⁶ The use of any specification (military, commercial or performance) must be a carefully managed process to effectively acquire future weapon systems that will be affordable, supportable and meet our war fighting needs. This management effort should include the adequate research of the available specifications, training of our acquisition workforce, use of metrics to measure the effectiveness of performance and commercial specifications. In addition, the effort should allow the flexibility for program offices to determine which specification to use for a particular requirement.

This paper will go over the need for and current efforts in acquisition reform, particularly in the area of MILSPECS and MILSTDs. Next, a background of MILSPECS and MILSTDs will be provided covering their origin, purpose and problems. A similar

background will also be provided regarding commercial and performance specifications. Then an analysis will be presented on the implementation of MILSPEC reform followed by recommended actions that will ensure DOD effectively manages the use of specifications and standards.

Notes

¹ Darleen A Druyan, Acting Service Acquisition Executive Secretary of the Air Force, "Speech to Air Force Association at Los Angeles, CA," SAF/AQC Homepage, 27 Oct 1995.

² Jacques S. Gansler, *Defense Conversion: Transforming the Arsenal of Democracy* (MIT Press, Cambridge, Massachusetts, 1995), pp.37-38.

³ William J. Perry, Secretary of Defense, *Acquisition Reform: A Mandate for Change*, 9 February 1994, p. 3.

⁴ Ibid., pp. 2-3.

⁵ Memorandum for the Secretaries of Military Departments et al., from William J. Perry, Secretary of Defense, Subject, *Specifications and Standards-A New Way of Doing Business*, 29 June 1994.

⁶ Logistics Management Institute Report, *Government-Imposed Barriers to the Use of Commercial Integrated Circuits in Military Systems*, February 1996, pp. 1-9.

Chapter 2

Need For Acquisition Reform

The Defense Industrial Base

The U.S. defense industry is characterized by its size and its capacity to mobilize when required. During World War II, it produced 296,00 aircraft, 1,201 naval vessels, 65,546 landing craft, and 86,333 tanks for allied powers. Though this industry was demobilized after the war, it was reactivated during the Korean conflict and remained at a wartime level during the cold war.¹ Because of a reduced strategic threat and economic pressures to reduce our budget deficit, the post cold war era is another time of change for our defense industry. Our nation's leaders realized that this change must occur without severely impacting our defense capability and our economy. President Dwight D Eisenhower, who coined the phrase "military-industrial complex," first warned of the potential impact that the defense industry has on the U.S. economy and the importance it has on our national defense.² Today we must understand our defense industry and consider both the potential impact and benefits to our defense capability that may come out of any changes in DOD.

Our defense industry is made up of contractors who deal directly with the government (known as prime contractors) and the prime contractors' suppliers (known as

the subcontractors). For our major weapon systems, the prime contractors are the manufacturers whose primary business is defense. Their lower tier subcontractors provide components, like electronic parts, that are a key part of the weapon system performance. These suppliers normally provide parts and components for both defense and commercial contracts. For many, the commercial market is a predominant part of their business base. One of the commercial industries that plays a significant role in our weapon systems is the electronics industry.

DOD And The Electronics Market

Technology for the electronics industry is driven by commercial markets and is evolving at a rapid pace. The growth of computers, personal communication equipment, office automation, and factory automation, has put the commercial electronics market significantly ahead of the defense market. And the gap is growing wider. At the same time, DOD is moving to more information based requirements involving sensors, computers, intelligence data, communications, and simulations.³

In addition to the requirement for electronics technology, there is another aspect of the commercial market that is attractive to DOD. Because of the intense global competition, companies in the commercial market place have reduced overhead costs, have fewer internal reporting requirements, and have given more authority to their operating managers. This has resulted in lower costs and an increase in productivity.⁴ Because of this competition and the high volume of commercial production, DOD can benefit both in cost and performance if it could integrate its electronics requirements with the commercial market place. However, there are barriers in terms of government

imposed technical and administrative requirements that impede the integration of civil and military production activity.

Some of these barriers are administrative, like requiring contractors to maintain certain cost accounting records and systems for their defense related work. Other barriers are technical in nature, like imposing MILSPECs and MILSPECs as contract requirements. Although these requirements had or may still have a purpose, they may limit the suppliers who can or who want to do defense business. Additionally, these requirements isolate the defense work from commercial work and make defense business uncompetitive with its commercial counterparts.⁵ Firms within the same company have to separate their commercial work from their military operations. An example of this is Motorola Corporation who operates two separate plants in Phoenix, Arizona. The commercial facility is a world class operation while the defense plant is obsolete.⁶ Another problem, amplified with a declining defense budget, is the added cost of doing defense vice commercial work. The American Defense Preparedness Association found the “cost premium” of unique government requirements has driven the “overhead” cost of doing defense business to 2 to 3 times that of commercial work.⁷

The above situation has been known by our acquisition leadership for quite some time. Numerous government commissions and studies have brought out the problem. However, until the 1990’s, there was not an urgent need to have greater access to commercial products from a technological or fiscal perspective. The required restructuring of the U.S. defense industrial base and the DOD approach towards acquisition could only come about with active government involvement and direction.⁸

The underlying question was how the DOD could shift from a Defense Industrial Base to a National Industrial Base.

Acquisition Reform

One of the major government initiatives towards achieving greater access to commercial products and services was the Federal Acquisition Streamlining Act (FASA) of 1994. One of the key aspect of the act was the expansion of the commercial product and service definition. Additionally, FASA established a preference on acquiring commercial over military products or services. This removed certain administrative requirements, like detailed cost and pricing data, for buying commercial products and services. Referring to FASA as an integral legislative vehicle for acquisition reform, Dr. Perry commented, “When I came to the Pentagon in 1993, one of my most important initiatives was to achieve real acquisition reform... The real objective of acquisition reform is to allow the Defense department to buy products (weapon systems), not only at lower cost, but also to get higher-quality products because we have access to the most modern technology.”⁹

The other key issue that DOD faced was the military-unique product and process specifications and standards (MILSPEC and MILSTD) use to acquire military systems. To address this issue, a process action team (PAT) was established, by the Office of the Secretary of Defense, to analyze why Government specifications and standards were being used despite a three year old policy providing a preference for commercial and performance specifications.¹⁰ Based on this PAT, another significant directive was issued via a 29 June 1994 memorandum, *Specifications and Standards—A New Way of Doing Business*, by Dr. Perry. This memorandum became known in the acquisition community

as the “Perry Memo.” The memo directed that performance and commercial specifications be used when purchasing new systems, major modifications, and upgrades to current systems. If it was not practicable to use a performance specification, a non-government standard would be used. When MILSPECs were required, they were authorized as a last resort with an appropriate waiver. Waivers for the use of MILSPECs had to be approved by the Milestone Decision Authority. The purpose of the memo was to remove the technical barriers that impede the access to commercial products. Both FASA and the “Perry Memo” provided the required direction for greater access to commercial products for the acquisition of military systems. They provided a clear preference for the acquisition of commercial products and the use of performance and commercial specifications. However, the use of MILSPECs and MILSTDs was not prohibited and could be used when shown to be cost effective and required for system performance.

How the “Perry Memo” was implemented by the military services and the potential problems will be addressed later. For DOD to keep up with the pace of technology development, barriers had to be removed to allow easier the access for commercial side of U.S. industry to participate in defense acquisition. Initiatives like FASA removed many of the administrative barriers, while the “Perry Memo” removed technical barriers brought about through the use of MILSPECs and MILSTDs to acquire military systems. To understand the current MILSPEC and MILSTD reform it is important to trace the origin of military specifications and standards.

Notes

¹ Jacques S. Gansler, p. 19.

Notes

² Ibid., p. 20.

³ Ibid., pp. 37-38.

⁴ Ethan B. Kapstein (ed.), *Downsizing Defense*, Washington DC: Congressional Quarterly Inc., 1993. p. 190.

⁵ Jacques S. Gansler, p. 23.

⁶ Ibid., p. 24.

⁷ “Acquisition Reform” presentation during Acquisition Stand down Day, Cataloging & Standardization Center, Battle Creek, MI., 31 May 1996.

⁸ Jacques S. Gansler, p. 27.

⁹ Collie J. Johnson, “DOD Press Briefing Underscores Important Acquisition Reform Initiative,” *Program Manager*, March-April 1996, p. 6.

¹⁰ William J. Perry, February 9, 1994, p. 18.

Chapter 3

Military Specifications And Standards

Origin Of MILSPECs

Specifications and standards are difficult to understand, much less reform. The first area to understand is the terminology. Industry uses the term “standards” in relation to both products and processes. In DOD, “specifications” are used to describe products, material items, or components, while “standards” describe methods, processes, or procedures.¹ The origin of MILSPECs came from an attempt to guarantee product performance of military equipment. Any failure of this equipment under the stress of combat and in often a harsh environment could cause a tremendous loss of military lives and defeat. History has provided some bitter experiences.

In 1879, a column of 1,300 British soldiers was annihilated because their ammunition cases were screwed shut. In 1942, the German army’s 48th Panzer Division found that only 42 of the 104 tanks en route to Stalingrad could be moved; mice had eaten the insulation off the electrical wiring of the other tanks. In the South Pacific in World War II, the U.S. supplies shipped to the area at enormous expense were corroded by fungus. Today, specifications ensure that ammunition boxes can be opened without tools, insulation is rodent proof, and fungus is not a threat.²

Purpose Of MILSPECs And MILSTDs

In the early 1990’s, there were approximately 30,000 MILSPEC and MILSTD documents. These documents have been viewed as the foundation for our superior

military weapon systems.³ A military specification describes the essential technical requirements for purchased material that are military unique or are substantially modified commercial items, while a military standard establishes uniform engineering and technical requirements for military unique or substantially modified commercial processes, procedures, practices, and methods.⁴ Military specifications and standards were created with a great deal of analysis and rationale. MIL-STD 961D, Appendix A, provides for the scope, purpose, requirements and verification for military specifications. It also establishes the format and content guidelines for program unique system, item, software, process and material specifications. Its purpose is to establish uniform guidelines, define essential requirements, ensure verification methods for each requirement and aid in the use and analysis of requirement content. Most importantly, it defines the analyses, modeling and simulations, demonstrations and tests to be performed in order to ensure that the product, material or process conforms to the essential requirements.⁵

Specifications and standards are not unique to military acquisitions. They are used by quality manufactures and suppliers around the world. For example, they ensure that plugs from different appliances fit into the same electrical outlet and that light bulbs fit into standard fixtures.⁶ For the military, the rationale for specifications and standards is driven by the special requirement of fielding many advanced systems that have to perform under the stress of combat with critical logistical requirements. If any system is to breakdown in the field, like an M-1 tank, the military wants to ensure that there are not five different versions of the spare part required to make the system operational again. Standardization is required for spare parts and the maintenance manuals to repair the

systems. The lack of standardization would create a logistical problem which would get even larger if each Service were to stock different versions of the same component for each of their systems.⁷ One of the key standardization issue for military weapon systems is interoperability and interchangeability.

The first question asked is whether a part is going to be repaired or replaced. If the part can be thrown away, then all that is required is a performance specification that defines the performance and interface requirements of the item. Under this situation, performance of the part within a larger system becomes the key requirement. However, if the logistic plan calls for a part to be repaired in the field under battlefield conditions, the configuration of the parts must be identical for the stockpiling, maintenance and training requirements to be effective. This would require a detailed, military-unique design specification.⁸

MILSPECs Pertaining to Electronics

Since a key part of acquisition reform was to improve the access to the commercial electronics market, it is important to understand the role of MILSPECs and MILSTDs in that market. When developing contract requirements, a number of issues need to be addressed. As mentioned above, logistical considerations need to be determined and specified. Other key requirements are the functionality and operating environment of the system. The contract requirement process flows down at the system level but its influence is at the parts level. Integrated Circuits (IC) are a critical component for many of our military systems. Figure 1 describes the requirements process flow and the role MILSPECs play in IC part selection, design, and manufacture.⁹ This process starts at the

system or device level, with contract requirements outlining the functionality, operating environment and logistic requirements of the system or device being procured.

As figure 1 shows, system performance requirements direct the IC device requirements. As you go down the requirements process, there are a number of decisions which either direct particular parts from a military parts list or allow the contractor to choose to use a commercial part. Commercial ICs are frequently not used because of insufficient data supporting their capability of operating in the environment required for military use.¹⁰ Military parts lists serve the purpose of controlling the proliferation of parts in the military supply system and its inventory costs. Most importantly, it lists the parts that have been qualified for use. This would include militarized versions of commercial ICs. If a military or commercial part does not exist, the contractor must design a new device or qualify an existing part. A number of MILSPECs may apply that would address the many performance requirements and the tests (electrical, thermal, chemical and mechanical) that devices must pass.¹¹

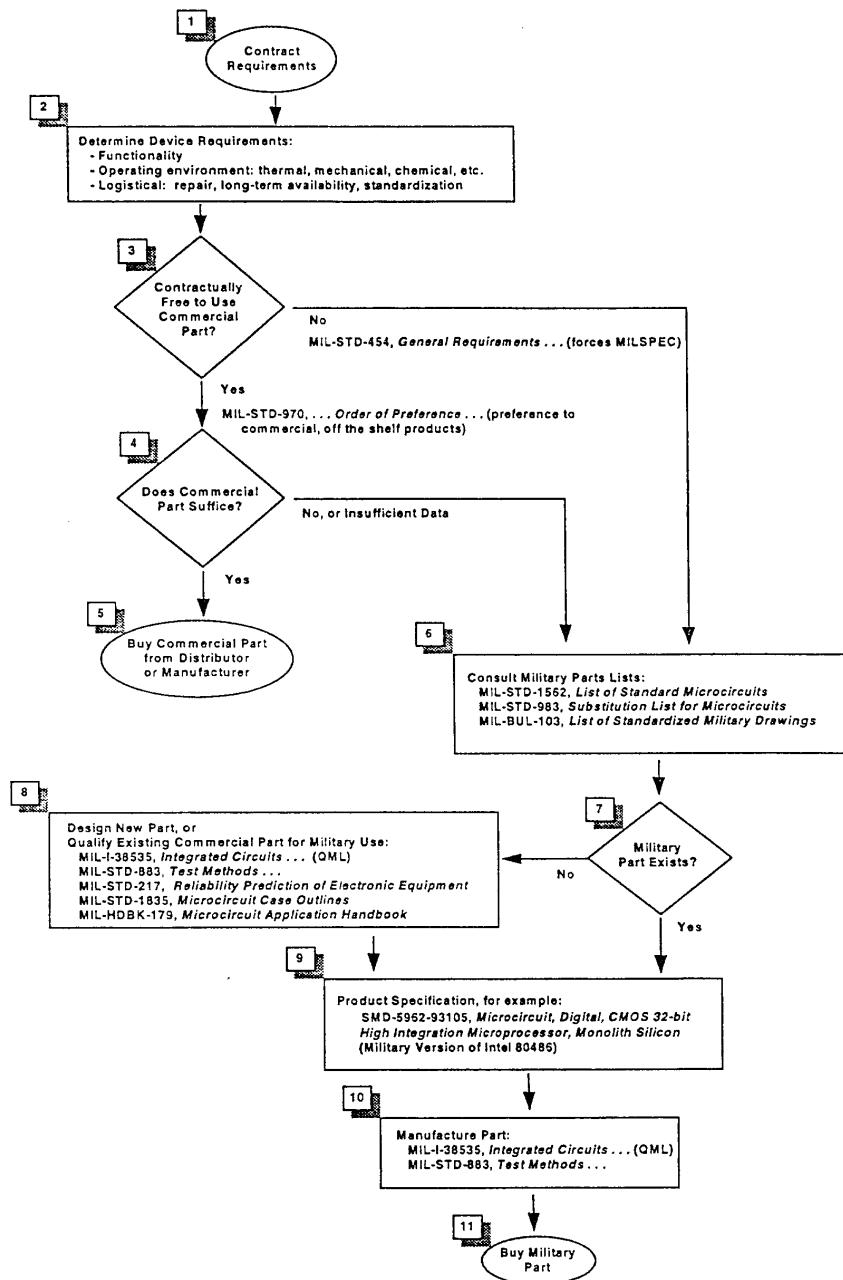


Figure 1
Role of Major MILSPECs in Integrated Circuits Part Selection, Design, and Manufacture

Figure 1. Role of MILSPECs

Figure 1 demonstrates the benefits of MILSPECs and MILSTDs for most military acquisitions. Specifications and standards describe the performance requirements for a system and how the various components are incorporated into the larger system (form, fit, and function). However, over the 40 years of its inception, there has been an increasing problem in the use and content of military specifications.

Problems with MILSPECs and MILSTDs

Discussions of the MILSPEC problem often confuses two separate issues. The first is the military's practice of using MILSPECs to buy clearly commercial items: dog combs, tacos, fruitcakes. Applying MILSPECs to these type of items creates several problems. DOD may have to pay for specialized manufacturing capability to produce an item at a higher price than its commercial counterpart. A specification for white gloves caused one manufacturer to set up a different assembly line with a unit cost of \$32 per pair, while the same manufacturer sells nearly identical gloves commercially for \$20. A related issue in this area is that needless specifications take away resources from the task of drafting, reviewing, and updating specifications for combat equipment. The second issue involves dual-use materials and components that the military buys. Unlike gloves, which can be bought off-the-shelf, these parts must be tailored for the application. MILSPECs and MILSTDs often make it impossible for a commercial companies to do business with the DOD, even though they are technically capable of producing the item. In particular, when the specification tells the contractor how to make the product, the type of quality assurance program, and how to manage the program, it keeps world class producers away from DOD business.¹²

The problem of MILSPECs and MILSTDs is not with the principle behind it but rather in the way the documents are written and applied along with the lack of authority and control over the standardization process. In particular, military specifications create a problem when they do the following:

- Describe essentially nonmilitary items;
- Reference obsolete products and processes;
- Detail requirements relating to process rather than performance;
- Differ from common commercial practices and standards.¹³

Even with well established military specifications and standards, a problem can exist if they are not properly tailored to the system to be acquired. Requirements are put on contracts that add cost without value and unnecessarily differentiate commercial and military operations.¹⁴

Unnecessary requirements have found their way into DOD contracts for a number of reasons:

1. *Established Practices*: acquisition activities borrow from previous requirements documents, i.e. statements of work or technical specifications, on the assumption that what worked before will work again. This copying from one contract to another brings about inappropriate specifications and standards that have been canceled or are not cost-effective or necessary for this particular contract.
2. *Comfort Level*: requirements are put on contracts out of fear of being accused of mismanagement if they were eliminated.
3. *Excessive Referencing*: if properly applied, referencing of other specifications and standards can reduce length and complexity. However, there are many references that are inappropriate and excessive for the particular procurement on hand. Where commercial and military standards tend to differ is in the number and types of references. Sometimes this difference is 2 to 1.
4. *Tiering*: the referencing of MILSPECs and MILSTDs creates an enormous tiering in which one reference brings about another reference without regard to its need in a contract. This is a particular problem during the production phase of a DOD acquisition.
5. *Improper Tailoring*: MILSPECs and MILSTDs provide guidance on a variety of engineering matters depending on the requirement being procured. If the specification or standard is not properly tailored for a particular contract (a whole

MILSPEC is called out instead a portion), more requirements than necessary are added which drives up the cost and may make the item unnecessarily defense unique.¹⁵

There has been a widespread belief that military and civilian technologies are inherently different. Military unique systems must push the envelope of performance and endure harsh battlefield environments. This has brought about a belief that has driven the need to have military specifications to ensure performance of military products. Critics of the “uniqueness position” believe that commercial products can be as rugged as those built to MILSPECs and MILSTDs.¹⁶ For example, in Desert Storm many commercial electronic components, from semiconductors to global positioning systems, met or exceeded their military counterparts’ performance at a significantly lower price.¹⁷

This chapter provided the background of military specifications by first, outlining their origin from fatal experiences with inadequate equipment. Then the discussion looked at MILSPECs today with the foundation of providing essential technical requirements to ensure product performance and standardization. Next came a look at MILSPECs pertaining to the electronics market followed by an analysis of some of the problems relating to the use of MILSPECs and MILSTDs in DOD. This chapter provided the rationale for the use of MILSPECs along with some abuses. Now let’s take a look at the use of commercial and performance specifications.

Notes

¹ Office of the Under Secretary of Defense for Acquisition & Technology (OSD A&T), “Report of the Process Action Team on Military Specifications and Standards, April 1994, p. 17.

² Debra Van Opstal, “Road map for MilSpec Reform: A National Imperative.” *Program Manager*, 1994, p. 10.

³ Washington Technology, “Efficiency vs. 200,000 Jobs,” March 26, 1992.

⁴ OSD A&T Report, DOD 4120.3-M 1993, April 1994, p. E-3.

Notes

⁵ Office of the Under Secretary of Defense for Acquisition & Technology, Standardization Program Division, Briefing on Specifications & Standards Reform, 31 May 1996.

⁶ OSD A&T Report, April 1994, p. 17.

⁷ Ibid., p. 18.

⁸ Ibid., p. 18.

⁹ LMI Report, pp. 2-10, 11.

¹⁰ Ibid., pp. 2-10.

¹¹ Ibid., pp. 2-12.

¹² Report from The Center for Strategic & International Studies, "Road Map for MILSPEC Reform, 1993, p.7.

¹³ Ibid., p. 9.

¹⁴ OSD A&T Report, April 1994, p. 41.

¹⁵ Ibid., pp. 41-42.

¹⁶ Congress of the United States, Office of Technology Assessment, "Holding the Edge: Maintaining the Defense Technology Base," U.S. Government Printing Office, Washington, DC, April 1989, p. 162.

¹⁷ *Washington Technology*, March 26, 1992.

Chapter 4

Commercial And Performance Specifications

What is a Performance Specification?

As mentioned earlier, one of the keys to obtaining the latest in electronic technology at the lowest possible cost is through the military-commercial market integration. To accomplish this, DOD must use performance specifications, when practicable, in specifying its requirements. The following is the definition of a performance specification from a DOD Policy memo 95-2A issued on March 10, 1995: “A performance specification states requirements in terms of the required results with criteria for verifying compliance, but without stating the methods for achieving the required results. A performance specification defines the functional requirements for the item, the environment in which it must operate, and interface and interchangeability characteristics.”¹

A key aspect of a performance specification is that it describes only the form, fit and function of the required product. An example of this is the required size, weight, durability of an item. This allows the contractor to control the production baseline by giving the contractor detailed configuration management authority. By specifying functional requirements, the contractor has greater flexibility to incorporate the latest

technology and manufacturing methods in the product.² This will allow for a variety of design and manufacturing solutions that will encourage more commercial companies to bid for the work, particularly at the subcontract level.

Aside from allowing greater access to more advanced technology, this will also provide a cost benefit. This comes from greater competition and the fact that commercial companies have already made the research and development, tooling and equipment investment to provide their commercial product. DOD and its prime contractors can leverage on an existing capability for their requirement.³ Another characteristic of performance specifications is that the contractor picks the test procedure that may offset some of the cost benefits with higher risks. This will be addressed later in this chapter.

What are Nongovernment Standards?

Standardization in the commercial arena is used for both technical and economic reasons. It simplifies the maintenance and repair of systems, ensures that systems are Interoperable with other systems and often lowers costs through quantity purchasing. In the commercial sector, companies get together to establish minimum performance requirements for their particular industry. There are national standards setting organizations, like the American National Standards Institute, that set performance standards (i.e. quality and reliability) for the industry. There are international standards, like ISO 9000 series for quality assurance.⁴ However, the initiative to merge the military and the commercial industrial base by encouraging the use of performance and commercial specifications doesn't come without concerns and potential problems.

Concerns of Using Performance and Commercial Specifications

As shown above, MILSPECs were established for some very good reasons and their real purpose is to reduce combat risk. So it's important that we examine the critical and unique aspects of our military systems and how performance specifications fit in. The first area is the environment that military systems operate in. The Air Force and contractors have expressed concerns over using commercial grade electronic boards on fighter aircraft. People in this community find it acceptable to avoid MILSPECs for the C-130, C-17 or C-5A, where the environment is not harsh, but not for fighter aircraft.⁵ On the latest fighter development program, the F-22, there is some concern over the use of commercial specifications. For this and other military systems there is the harsh environment of heat, cold, vibration, as well as the military unique requirement for chemical, nuclear, biological protection. Circuit boards built to commercial specifications may not survive or protect the system without special insulation which may create a money, schedule and weight issue for the program.⁶

Another area of concern is with the contractor being capable of meeting the environmental or any other technical performance requirement in testing and evaluation. Performance specifications may require more testing and evaluation of parts and systems to demonstrate that they meet requirements.⁷ However, a greater concern is whether or not commercial vendors will allow test information on their parts to be released. Some vendors of commercial hardware have succeeded in blocking the release of test results on equipment under the threat of lawsuits. A government organization, after carrying out testing of DC-DC converters, was deterred from publishing the results on the World Wide Web as the testers intended. This brings up a growing design issue where commercial

parts are concerned and the occasional need for more rigorous testing than commercial contractors typically perform. This type of testing and its results are required before a decision can be made between choosing commercial or MILSPEC parts.⁸ When a MILSTD is not used, is there an appropriate non-government standard available?

One important part of this reform effort is the replacement of MILSTDs with non-government standards. In those situations where a military standardization document is also used by commercial companies, a suitable non-government standard needs to be created.⁹ However, since the issuance of the “Perry Memo,” there have been wholesale cancellations of military standards that provide a useful purpose without a suitable replacement. A particular concern was the cancellation of military documents that provide the essential information that defines as much as one-third of the parts used on most of the aircraft built. According to the Aerospace Industries Association (AIA), DOD is canceling documents that are the state-of-the-art in commercial practices. The burden then falls on industry to prepare new documents to replace the ones that are canceled.¹⁰ As mentioned earlier, one of the purposes of specifications and standards, both in military and commercial acquisitions, is to help in the logistical support of a system.

Logistical support is probably one of the biggest concerns with the new emphasis on performances specifications. Though personnel from the OSD Standardization Program Division believe this has been blown out of proportion¹¹. There are those who remember the logistics and maintenance nightmare of programs like the F-111. Supportability must be built into the design and the concern is that if military standards, like MIL-STD-1388, Logistics Support Analysis, are not requirements on contracts, then proper supportability

requirements will not be adequately spelled out in performance specifications.¹² Another characteristic of performance specification is that it leaves the parts or materials selection to the contractor. This brings up the concern of the proliferation of spare parts that meet the performance requirements. When addressing this and other logistical support concerns, the reply from the OSD Standardization Program Division is to “place the burden on the contractor” and “make it (logistical requirements) a performance requirement of the contract.”¹³ This statement does not relieve the concern that people have in this area. Another important logistical concern with performance specifications is the interface requirement. It is important to know early in the development phase of a program what the support philosophy of the program will be. Then the interface requirements can be defined in the performance specifications. With electronics parts technology, where new designs may take place every few years, a plan must be developed to handle new parts in the spare parts pipeline.¹⁴

This chapter provided an overview of commercial and performance specifications and standards. First, a description of these specifications and standards, and how they are developed and managed by industry was presented. Next came the concerns of using these specifications and standards in acquiring weapon systems, particularly in the areas of testing and logistical support. All of these concerns must be addressed by OSD and the Services as they attempt to implement MILSPEC reform.

Notes

¹ Walter B. Bergmann II, Memorandum for Defense Standards Improvement Council, subject Revised Policy Memo 95-2A, “Processing Performance Specifications,” 10 Mar 95.

² OSD A&T Report, April 1994, p. 21.

³ Ibid., p. 19.

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⁴ Ibid., p. 18.

⁵ Baker, D., "DOD & Defense Contractor requirements for COTS & Rugged Computers," Technology Research Institute, Sudbury, MA, pp. 6-9.

⁶ Discussion with Mike Costigan, Lt Col, USAF, former Chief of the F-22 Avionics Branch, now Air War College student.

⁷ OSD A&T Report, April 1994, p. 19.

⁸ Wilson Dizard III, "The Dark Side of COTS - Threatened Lawsuits Stifle Test Results, *Military & Aerospace Electronics*, September 1996.

⁹ Water B. Bergmann II, Memorandum for DOD Standardization Management Activities, Subject "Non-Government Standards Policies, July 7, 1997.

¹⁰ Bruce Mabone, "AIA Establishes Early Warning Project for Military Specification Cancellations, *AIA Newsletter*, March 1996.

¹¹ Office of the Under Secretary for Acquisition & Technology, Standardization Program Division, "Questions and Answers Issue," January 1995, p. 7.

¹² Vince DiNicola, "Back to the F-111?," *SOLEtter*, February 1995.

¹³ "Questions and Answers Issue," January 1995, p. 7.

¹⁴ Interview with Mr. Bob Lightsey, Professor in the Systems Engineering Department of the Defense Systems Management College, Sep 1996.

Chapter 5

Implementing MILSPEC Reform

Service Implementation

A key aspect of MILSPEC reform was to change the way the individual Services established requirements, in particular specifications and standards, for their solicitations and contracts. The intent of the “Perry Memo” was to reverse the priority by which military and commercial specifications and standards were used in contract actions. This memo recognized that some MILSPECS and MILSTDs were unique and should be used. The use of military specifications and standards were authorized as a last result , with an appropriate waiver.

Waivers must be approved by the Milestone Decision Authority (MDA) as defined in DOD Instruction 5000.2.¹ The MDA may be at the OSD level, for large programs designated acquisition category (ACAT)1D, or at the individual Service level for programs that are not ACAT 1D. Whether the MDA is at the OSD or Service level, the key decision point for deciding on the use of MILSPECS is the individual Services. This is because most program offices, who generate the requirement, reside within the Services and all acquisition decisions are either coordinated (thereby strongly influenced) or approved by the Services.

One of the intents behind the “Perry Memo” was to eliminate a culture surrounding the use MILSPECs and MILSTDs without the thought of purpose. However, a culture has developed within the Services creating an attitude of a complete ban of MILSPECs and MILSTDs without regard to their purpose or value. Within the Army, the unwritten rule for program managers (PM) was not to have any MILSPECs or MILSTDs in your program if you wanted it approved. Those PMs wanting to use MILSPECs and MILSTDs, but also wanting their program to get through the approval process, resorted to writing MILSPECs and MILSTDs in full text without the “MILSPEC label” or putting MILSPECs and MILSTDs on solicitations and contracts for “guidance only.”² This became a method of PMs throughout the acquisition system to get a MILSPEC or MILSTD as a requirement while getting the program through the approval process. This practice became a concern for the acquisition leadership within DOD and industry. It sent a confusing message to industry (what’s the requirement?) and did not promote the cultural change regarding MILSPECs. MDAs were tasked to challenge those programs that excessively list MILSPECs for guidance only.³ The Air Force created RFP Support Teams whose job was to scrub RFPs and ensure performance-based specifications were used in lieu of MILSPECs. However, many senior acquisition managers questioned the role of these support teams as “facilitators” or as another layer in the review process.⁴ With this senior leaderships emphasis towards performance specifications, what has individual programs done?

Examples Of MilSpec Reform

There have been a number of programs that have gone out and really scrubbed their requirements. As can be seen from the following list of Air Force programs, they cover a variety of types of programs in various stages in the acquisition cycle.⁵

- Program Specs and Std.
- C-130 Periodic Depot Maintenance From 200 MILSPECS & Std. to 5.
- Maintenance Skills Trainer From 21 MILSPECS & Std. to 0.
- KC-135 Avionics Upgrade No MILSPECS or Std. in RFP.
- Milstar Satellite Communications From 110 MILSPECS & Std. to 43.
- Joint Direct Attack Munitions Development No MILSPECS or Std. in RFP.
- The other Services have made similar efforts in reducing the number MILSPECS in their solicitations and contracts.

The initial results of MILSPEC reform has been positive with greater access to commercial technology, improved performance, and over \$2 billion in anecdotal savings and cost avoidance.⁶ However, not all of these savings can be attributed to removing MILSPECS. Other acquisition reform initiatives have also contributed to reduced program costs. One of these efforts is reducing the data requirements in contracts which makes up a significant amount of program costs. Another initiative that the Air Force is advocating is having statements of objectives vice statements of work to get away from telling the contractor “how to” make a product or perform a service. The Services, with support from DOD, is reducing costs by promising contractors a stable production quantity through multiyear and other contract incentives. Additionally, DOD can not lose sight of one of the main goals behind MILSPEC reform which is easier access to state of art technology. This reform is not limited to the actions of program offices.

Document Infrastructure

An important part of MILSPEC reform will be to implement standardization document improvements. This is a challenging task for DOD involving many documents and preparing activities: the Services, Defense Logistics Agency, Industry and other government agencies. DOD intends to have a document infrastructure based on performance specifications and interface standards for weapon systems and military unique items of supply; commercial item descriptions and non-government standards for commercial items and processes; and a library of guidance handbooks that contain lessons learned and offer known technical solutions.⁷ This will be the key effort for an effective and permanent MILSPEC reform. With over 30,000 MILSPECs and MILSTDs, and the many preparing activities, this will not be an easy task and will require an active central effort led by DOD.

The Standardization Program Division of the Acquisition Practices Directorate of OSD was tasked to lead this effort. One of the first things this organization established was a communication forum. A “MilSpec” Reform” Homepage was established on the World Wide Web and was the top 5 percent of the most frequently accessed homepages on the Internet. The Homepage included policy and guidance memos, questions and answers on MILSPEC reform, status reports on the top 100 cost driver documents, lists of proposed canceled documents, lists of recently canceled documents, the Standardization Newsletter and hot links to other related homepages.⁸

While this has been a positive effort, there is still a more challenging task of standardizing the way the Services are handling the cancellation and waiver process of MILSPECs. Each Service is deciding which MILSPEC will be allowed without a waiver

and which ones cannot be used at all. An example of this is with MIL-STD-1388, Logistics Support Analysis, which is allowed by one Service but not another. This inconsistency will cause problems in joint programs where systems will be fielded by the individual Services and in contractor facilities where one contractor could have two specifications for a process or processes. This is type of situation conflicts with the goal of MILSPEC reform.⁹ Another important player in MILSPEC reform is industry.

Industry's Role

The first key aspect that industry played in this reform effort was the keeper of the non-government standards. An example of this was the Aerospace Industry Association (AIA). AIA's National Aerospace Standards has been a part of worldwide aerospace production since 1940. They define a large portion of the parts for commercial and tactical fighter aircraft. AIA has the largest collection of standards of any trade association and define more national stock numbers than any other non-government agency.¹⁰ Industry must have a continual dialog with DOD regarding the proper documentation to use as requirements for the acquisition of its weapon systems. As outlined above, it must complain when MILSPECs are canceled without a proper commercial replacement. During the solicitation process, it must recommend the use of MILSPECs when it would be the best way to acquire a system. As a united front, it must insist that test results of commercial parts or components are published to allow its use for military systems.¹¹

This is a key chapter because it entails how MILSPEC reform has been implemented by the Services and their applicable program offices.. It provides Air Force examples of reform efforts along with the efforts OSD plays in improving standardization

documentation. Finally, it outlines the key role industry plays in the MILSPEC reform effort. Though MILSPEC reform has been a good initiative for the military acquisition, it needs to be properly managed.

Notes

¹ William J. Perry Memo, dated 29 June 1994.

² Based on the author's experience and discussions with acquisition managers at the Defense Systems Management College.

³ "Questions and Answers" from the *Standardization Newsletter*, p. 13.

⁴ Comments made during the Question and Answer session of the Air Force Contracting Conference in Washington DC, Spring 1996.

⁵ Office of the Undersecretary of Defense for Acquisition & Technology (OSD A&T) Report, "MILSPEC Reform - Results of the First Two Years," June 1996, p.3.

⁶ Ibid. p.19.

⁷ Ibid., p.10.

⁸ Ibid., p.11.

⁹ Interview with Mr. Joe Delorie of the Standardization Program Office, 13 September 1996

¹⁰ AIA Newsletter, March 1996.

¹¹ Military & Aerospace Electronics Newsletter, September 1996.

Chapter 6

Where Do We Go From Here?

Benefits and Risks

DOD's MilSpec reform appears to be achieving its stated objective: reducing acquisition costs, enabling greater access to state-of-the-art technology, and integrating the defense and commercial market places. The benefits will be more dramatic with electronics parts as they make up a large part of our weapon system and whose technology is growing at a rapid pace. However, the key word is "appears" as this initiative is still in its early stages. Only over time, as new systems that are using performance specifications vice MILSPECs are fielded, will the effectiveness of this reform be measured. Dr. Perry's 29 June 94 memo provided the proper framework for change within the acquisition community for both the government and industry. This change will open the minds of those developing requirements to utilize all the specifications available, from performance specifications to MILSPECs in acquiring weapon systems. Emphasis on government specifications was turned around with MILSPECs going from the preferred to the least preferred specification method. However, MILSPECs were not eliminated with the "Perry Memo," but that is not the attitude that Service implementers had.

The way the “Perry Memo” was implemented by the Services has brought about some unnecessary risk to DOD’s acquisition. By creating an attitude of “don’t bring a MILSPEC in for a waiver” the senior leadership has forced program managers to abandon MILSPECs without the proper performance or reliability knowledge of appropriate performance or commercial specifications. It has also created a situation of gaming the approval process by putting MILSPECs on solicitations and contracts as guidance documents or in full text. Both practices confuse industry. The other risk is not having performance and reliability data on commercial parts in the harsh environment that military weapons operate under. With the freedom of design of performance requirements, it is more critical to have the right interface specifications on our complex weapon systems. In order to reduce the above risk, there must be a continued emphasis on research, training, metrics and flexibility regarding specifications.

Research

DOD and industry must continue its research on the performance and reliability of its commercial parts. This includes testing under the harsh conditions that military systems are used under and also the interface of these parts into the military systems that they will be a part of. Industry must be willing to open up its test data to others to enable informed decisions regarding contract requirements. This research will require funding by DOD in a time of declining budgets. DOD must be careful in not counting its savings from MILSPEC reform too early and set aside some funding for required research on commercial parts. Prime contractors must be incentivized to conduct performance research and conduct tests on commercial parts to determine how they will interface with

military systems. Knowledge of creating performance specifications can only occur through training.

Training

As the MILSPEC reform was implemented, personnel who had to write requirements documents were left in a difficult situations. Many of these personnel, both in industry and DOD, were trained and had the experience of using MILSPECs in calling out requirements for an acquisition. As a instructor, at the Defense Systems Management College from 1993-96, I came upon a number of personnel who were concerned by not having the experience with writing performance specifications with little guidance provided from their management. Training must be accomplished using all available media: Internet, classroom, conferences and video. The Standardization Program Office must be the centerpiece to ensure that adequate information is available for all personnel involved in developing requirements documentation. However, only through proper metrics will we know how effective the MILSPEC reform has been.

Metrics

In the current acquisition reform environment, the only metrics that I'm aware of is the counting of MILSPEC documents and projected cost savings. This does not provide a measure of the effectiveness of utilizing performance and commercial specifications. A more appropriate measurement would be to compare the performance and reliability of the parts for systems acquired by using performance specifications vice MILSPECs. Another metric that could be used to measure cost as a comparison is the total Life Cycle Cost of a system. This would give a measurement on how cost effective commercial

parts are in not only in development and production, but the more important area of operational and support costs.

Flexibility Of The Specification Used

In order to be both effective and efficient, the Services must follow the direction provided under the “Perry Memo.” The intent of MILSPEC reform was to put an emphasis on performance specifications over MILSPECs, not eliminating their use. However, the overzealous implementation practices of the Services has created an environment of eliminating MILSPECs completely. This practice has to stop before too many weapon systems are developed without the proper knowledge of the performance specifications being put on contracts. Specifications and standards are the most important part of weapon system development. Because they represent key technical decisions, the type of specification is best left to a knowledgeable program team. The specification decision should be left to the program manager, who is responsible for the success of the program, with the approval of the Milestone Approval Authority. There should not be a preconceived decision (i.e.,” don’t bring us a program with MILSPECs”) which is the current environment in the Services. The “Perry Memo” set the stage for acquisition reform, now it must be properly managed. This can only occur through research, training, metrics and flexibility in the type of specifications used to acquire effective weapon systems.

Bibliography

- “Acquisition Reform” presentation, Cataloging & Standardization Center, Battle Creek, MI., 31 May 96.
- Air Force Contracting Conference, “Question and Answer Session,” Washington DC, Spring 1996.
- Baker, D., “DOD & Defense Contractor Requirements for COTS & Rugged Computers,” Technology Research Institute, Sudbury, MA.
- Bergmann II, Walter B., Memorandum for Defense Standards Improvement Council, subject Revised Policy Memo 95-2A, “Processing Performance Specifications,” 10 March 1995.
- Bergmann II, Walter B., Memorandum for DOD Standardization Management Activities, subject “Non-Government Standards Policies,” 7 July 1997.
- Congress of the United States, Office of Technology Assessment, “Holding the Edge: Maintaining the Defense Technology Base,” U.S. Government Printing Office, Washington, DC, April 1989.
- Costigan, Lieutenant Colonel Michael J., Former Chief of the F-22 Avionics Branch, now Air War College student, 1996-97.
- Defense Systems Management College, Comments made by acquisition managers to the author while assigned as an Instructor from 1993-1996.
- DiNicola, Vince. “Back to the F-111?,” *SOLEtter*, dated February 1995.
- Delorie, Joseph. Standardization Program Office Interview, 13 September 1996.
- Dizard III, Wilson, “The Dark Side of COTS - Threatened Lawsuits Stifle Test Results,” *Military & Aerospace Electronics Newspaper*, September 1996.
- Druyan, Darleen A. Acting Assistant Secretary of the Air Force for Acquisition, Speech delivered to the Air Force Association at Los Angeles, CA., 27 October 1995.
- Gansler, Jacques S., *Defense Conversion: Transforming the Arsenal of Democracy*. MIT Press, Cambridge, Massachusetts, 1995.
- Jehan Jr., Henry I., “MIL-SPECS and MIL-STDS No More?,” *Program Manager*, July-August 1994.
- Johnson, Collie J., “DOD Press Briefing Underscores Important Acquisition Reform Initiative,” *Program Manager*, March- April 1996.
- Kapstein, Ethan B., *Downsizing Defense*, Washington DC: Congressional Quarterly Inc., 1993.
- Lightsey, Robert, Department Chairman of the Systems Engineering Department of the Defense Systems Management College Interview, 13 September 1996.
- Logistics Management Institute Report, “Government-Imposed Barriers to the Use of Commercial Integrated Circuits in Military Systems,” February 1996.

Mabone, Bruce, "AIA Establishes Early Warning Project for Military Specification Cancellations," *AIA Newsletter*, March 1996.

Office of the Under Secretary of Defense for Acquisition & Technology Report, MILSPEC Reform - Results of the First Two Years," June 1996.

Office of the Under Secretary of Defense for Acquisition & Technology, "Report of the Process Action Team on Military Specifications and Standards," April 1994.

Office of the Under Secretary of Defense for Acquisition & Technology Standardization Program Division, "Briefing on Specifications and Standards Reform," 31 May 1996.

Office of the Under Secretary of Defense for Acquisition & Technology Standardization Program Division, "Question and Answers Issue," *The Standardization Newsletter*, January 1995.

Perry, William J. Secretary of Defense Report, "Acquisition Reform: A Mandate for Change," 9 February 1994.

Perry, William J. Secretary of Defense Memorandum for the Secretaries of Military Departments et al., Subject: "Specifications and Standards - A New Way of Doing Business," 29 June 1994.

"Road Map for MILSPEC Reform" Report from The Center for Strategic & International Studies, 1993.

van Opstal, Debra, "Roadmap for MilSpec Reform: A National Imperative," *Program Manager*, 1994.

Washington Technology, "Efficiency vs. 200,000," March 26, 1992.

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