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INDUSTRIAL MODERNIZATION INCENTIVES PROGRAM:
Uses In Space System Producing Industry

by

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The views and conclusions expressed in this paper are those of the author and do not reflect the official policy or position of the Department of Defense or the United States Government.

ABSTRACT

The findings of past and present Air Force Production Base Analyses acknowledge the existence of numerous production bottlenecks and constraints within the defense industrial base. These impediments to the successful fielding of weapon systems are often caused by inefficient manufacturing techniques and obsolescent plant equipment. In an effort to correct these deficiencies, the Air Force has embarked upon a unique program to induce contractors to invest in factory modernization projects utilizing the latest in production technology. The program is known in the Department of Defense as the Industrial Modernization Incentives Program (IMIP).

This paper discusses IMIP and how Air Force Systems Command and Space Division uses this contractual vehicle to provide incentives to contractors to implement modern equipment and management techniques in space system producing industry. Examples are given of improvements in space system production by the use of IMIP.

Introduction

The Industrial Modernization Incentives Program (IMIP) represents a joint venture between the government and industry to accelerate the implementation of modern equipment and management techniques in the defense industrial base. The success of this program can be measured in terms of the short-run shared savings accrued to the Government and in terms of the long-run gains of increased productivity, reliability, and responsiveness. Ultimately, these gains will translate into an industrial base capable of meeting defense requirements for modernization, readiness, sustainability, and expansion of the Armed Forces under peacetime, surge, and mobilization conditions.

In short, our war-fighting capability will improve significantly. Indications of success are already evident. The Air Force projects cumulative cost savings in excess of $7 billion. The costs savings in the F-16 program alone would enable the Air Force to buy an additional 180 aircraft. Other benefits are also beginning to accrue as evidenced by projections of yield increases from 65% to 90% (responsiveness), major technological advances in testing and inspection techniques (quality and reliability), and direct labor reductions of up to 45% (productivity).

The examples above are just a few of the many successes being experienced in the Industrial Modernization Incentives Program. The intent of this paper is to discuss some of the successes of IMIP in...
the arena of industry producing space systems. IMIP will first be described, a background will be provided, and a description of how an IMIP is developed will be presented. Following that, there is a discussion of current IMIP activity which points out many of the successful aspects of the program and includes a brief description of a few projects which are representative of the success of IMIP. Since this is an ongoing and growing program, the discussion is rounded out with a presentation of future IMIP activity.

IMIP Description and Policy

IMIP is a DoD program which evolved from the Air Force's TECHMOD and Army's Industrial Productivity Initiatives programs. In addition to implementation where competitive market forces are insufficient to bolster independent contractor modernization, IMIPs are implemented where significant benefits such as cost reduction, elimination of production bottlenecks, improved quality and reliability, and improved surge capacity can be expected to accrue to the Government.

The short term IMIP objective is to reduce costs and lead times and increase the quality of manufacturing through productivity gains. The long term objective is to have a healthy and strong industrial base to meet surge and mobilization requirements should a conflict or war arise.

Background

In the late 1970's the Air Force began efforts to motivate contractors to improve productivity through the introduction of new technology and equipment. These "modernization" programs helped acquisition managers to reduce costs of weapon systems while strengthening the industrial base. Each program was characterized by a technical and business agreement. Depending on the acquisition activity, these efforts were known as "TECHMOD", "GET PRICE", and "Industrial Productivity Initiative (IPI)"

In 1982, the Department of Defense consolidated the separate modernization programs into a single DoD test program, and the new name Industrial Modernization Incentives Program (IMIP) was coined. The test program culminated in 1985 with the drafting of a DoD directive (5000.XX series) which established IMIP as a DoD program for the systematic implementation of new technologies in the defense industry.

Today, the Air Force focus for industrial base investments is Air Force Systems Command's Aerospace Industrial Modernization (AIM) Office. The AIM Office functions as the principal source of information on industrial modernization objectives, techniques, and activities for both government and industry. The management of Air Force IMIP projects is the responsibility of the Manufacturing Directorates located within the Command's product divisions.

The IMIP Process

An IMIP effort can be initiated in a number of ways ranging from a requirement in a weapon systems' request for proposal to an unsolicited proposal from a contractor. Once initiated, an IMIP effort is normally accomplished in three phases. An IMIP effort can be in more than one phase at the same time. Figure 1 shows the IMIP phases.

Phase I is a structured analysis of the contractor's factory operation. It results in a plan to modernize the entire facility or a single product line by identifying contractor projects to be developed and integrated into the factory. DOD may directly fund the Phase I analysis. The plan identifies those investments which will result in costs reduction but are not projected to give the contractor an adequate return on investment.

Phase II entails the design, development, and validation of the new manufacturing system. New technology or equipment can be tailored to specific production applications. During this phase, DOD funds may be used to develop technology for a production application but cannot be used to purchase capital equipment. Projects that do not require development or validation may move directly to Phase III. At the conclusion of Phase II, the contractor may submit a capital investment proposal. This specifies the type, costs, and timing of contractor investments and incentives desired.
During Phase III, the contractor buys and installs capital equipment and associated software. Weapon system program offices pay incentives in accordance with prior agreements.

During this phased approach, DOD and the contractor negotiate one or more agreements either as part of a weapon system contract or separately. These agreements may include:

--Memoranda of understanding, which are usually agreed to before or during Phase I. These memoranda, which are not binding, generally define the scope of the effort and basic roles of the contractor, weapon system program office(s), and other services.

--Framework business arrangements, which are usually negotiated at the end of Phase I or early in Phase II. These arrangements vary considerably but generally lay out the types of incentives to be used, the general level of contractor investment expected, and the basis on which the investments will be analyzed.

--Implementation business arrangements, which are usually negotiated just prior to Phase III. These arrangements, which are binding, detail the exact investments to be made, estimated cost reductions, the amount and timing of incentive payments, and the method for verifying and tracking benefits.

An IMIP effort can include one or more weapon system programs, contractors, or benefiting services. For example, the General Electric company engine IMIP effort involves multiple weapon systems, several subcontractors, and all three services—with the Air Force as the lead service.

**IMIP Funding**

There are two kinds of funds which generally go to support IMIPs. They are program element 78011F dollars, also called Industrial Preparedness dollars, and Program Office dollars.

In many instances, Air Force funding for IMIPs is provided through a combination of PE 78011F and program Office money. For example, the Program Office may pay for the top down factory analysis (Phase I), while PE 78011F funds are used for development/validation of enabling technologies (Phase II).

If "seed money" is not provided by the government for an IMIP, would a contractor still be motivated to participate in an IMIP? The contractor still could be. The business agreement is protection against becoming more productive and then having the increased returns "negotiated away" during subsequent lot buys. The improved productivity means increased competitiveness. The participation also establishes a commitment to productivity, quality and cost reduction which can be weighed during past performance consideration of future source selections. Also, the contractor may reap advertising and publicity benefits by IMIP participation.

**IMIP Results**

The short term successes of IMIP are clearly evident. With a minimal investment of Air Force funds, defense contractors have been willing to invest substantial amounts of capital in the modernization of their factories. At present, for every $1 the Air Force invests, industry has invested $4, Figure 2.

IMIP savings projections are illustrated in Figure 3. These projections are based upon best available contractor estimates, and include cost avoidance since many will be using past IMIP efforts to reduce their prices on future work. Other assumptions include in compiling the projects IMIP costs savings are:

1. Approval of IMIP funding requirements through FY92 (including the FY88-92 POM submission),

2. Anticipated level of DoD business remains stable,

3. IMIP contractors are awarded DoD business as assumed in their out-year plans, and

4. The anticipated level of multiyear funding does not increase.

Given the above caveats, the Air Force should realize cumulative costs savings in excess of $7 billion by 1994. This is in
addition to the qualitative benefits of IMIP which are described later.

**IMIP in the Space Arena**

The focal point in Air Force Systems Command for Space related IMIPs is the Directorate of Product Assurance at Space Division. Space Division in the AFSC IMIP Technical Review brochure describes IMIP in much the same way as other Product Divisions. Space Division IMIPs promote productivity and quality improvements in space hardware manufacture. SD provides financial incentives to contractors for carrying out productivity improvements projects that might not otherwise be considered affordable or attractive. Projects may address the direct or indirect areas of manufacturing, integration and test. All contractors producing military space systems, and hardware subcontractors for these systems, are encouraged to consider the use of IMIP where it will be mutually beneficial to the contractor and government.

Space Division is currently involved in IMIPs with two contractors, General Electric and TRW.

At the Space Systems Division of General Electric Company four IMIP projects are in process with overall objectives being to improve productivity and competitiveness of the operation, and to reduce costs of the Defense System Communication Satellite III, DSCS III. The four projects include Automated Magnetics Testing, Computer-Aided Process Planning, Automated Data Collection, and Upgrading of the MIC/Micro Facility.

Automated Magnetics Testing has increased productivity through reduction in set-ups, handling and test time. Computer-Aided Process Planning will result in a more efficient method of generating operation instructions. The Automated Data Collection project will result in replacing manual labor vouchering with bar code reading. The upgrading of the MIC/Micro facility has resulted in increased productivity and lower costs through reducing the amount of manual labor required to process thin film microwave integrated circuits and thick film hybrids.

GE presented some of its successes of the DSCS III IMIP at the AFSC IMIP Technical Review in Orlando. Some of their lessons learned are valuable for Space System producing industry thinking of proposing an IMIP. These lessons learned are:

- You must have an innovative and open minded SPO and a strong corporate commitment to ensure a successful program.

- If you really know your facility (flows, cycle times, unit and operation costs) consider using a computer simulation to model your factory.

- Low volume producers of high tech hardware must concentrate on process similarities in their search for projects with meaningful paybacks.

Estimates are that the IMIP projects at GE will save the DSCS III program approximately $6 million.

Phase I efforts are currently underway at TRW's Space Park Complex in Redondo Beach California. The scope of this IMIP encompasses the manufacturing support functions of the Operations and Support Group's (O&SG) Manufacturing Division (MD). Further information on this just started effort will be covered in the next AFSC IMIP brochure.

One of the Findings of the AFSC Production Base Analysis Space Sector effort was that there is a need at the sub-tier contractor level for Government assistance in developing new and improved processes for upgrading manufacturing operations. There is also a need at selected firms for improvements in facilities and equipment necessary for more efficient production. Some of these sub-tier contractors are unaware of IMIP programs. Space Division is continuing to look for sub-tier IMIP candidates through normal business activities.

**Summary**

The Air Force loves IMIP. It provides incentives for capital investment. IMIP provides dollar savings to the government and IMIP improves the responsiveness, productivity of contractors facilities and the quality and reliability of the systems produced. Contractors love IMIP. Improved
productivity and competitiveness. Increased returns won't be "negotiated away" during subsequent buys. There is also publicity advantages.

In the arena of space system production the scenario is different in the aspect that its low volume high technology hardware. Thus benefits come from focus on process similarities. The government has limited "seed money" in the Program Element 78011F and program offices can also provide money for IMIP projects. Even without government providing any money, many business arrangements are negotiated to the benefit of both government and contractor.

If you want to receive brochures on AFSC IMIP activities and invitations to IMIP tutorials and conferences, please write:

HQ AFSC/PLM (Capt Phillips) 
WPAFB OH 45433-6503

If you are a contractor or subcontractor producing military space systems with Space Division and wish information on IMIP possibilities contact:

AFSD/PDP (Mr Henry Black) 
LAAFS, PO Box 92360 
Los Angeles CA 90009-2960
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<td>Investment in and installation of capital equipment</td>
<td>Cost reductions, other benefits, and incentive payments</td>
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(Figure 1)
Figure 2 illustrates the IMIP Funding Leverage from FY61 to FY7. The chart shows the distribution of funds between the government, with $470M in Air Force Seed Money, and the private sector with $1789 in capital investment. The vertical axis represents hundreds of millions of dollars, with values ranging from 3 to 18 (Hundred of $M).
CUMULATIVE IMIP SAVINGS
(ASS OF 1 JAN 86)

CUMULATIVE SAVINGS
($B)

FY 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94

CUMULATIVE IMIP SAVINGS

(FIGURE 3)