

**Cal Poly Apparel Manufacturing Demonstration -
Year 3 Final Technical Report
(and additional summary material from Year 1 and 2)**

Performance Period: 9/25/95 - 11/30/98

(Proprietary version for DLA-PM)

Date: May 31, 2000

**Apparel Technology and Research Center
California State Polytechnic University, Pomona**

Prepared by ATRC Staff

20000621 160

REPORT DOCUMENTATION PAGEForm Approved
OMB No. 074-0188

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing this collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503

1. AGENCY USE ONLY (Leave blank)		2. REPORT DATE May 31, 2000	3. REPORT TYPE AND DATES COVERED Final Technical Report 09/25/95 – 11/30/98	
4. TITLE AND SUBTITLE Cal Poly Apparel Manufacturing Demonstration Year 3 Final Technical Report			5. FUNDING NUMBERS SPO100-95-D1012	
6. AUTHOR(S) Apparel Technology & Research Center Staff				
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Apparel Technology & Research Center Cal Poly Pomona 3801 W. Temple Ave., #45 Pomona, CA 91768			8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)			10. SPONSORING / MONITORING AGENCY REPORT NUMBER	
11. SUPPLEMENTARY NOTES				
12a. DISTRIBUTION / AVAILABILITY STATEMENT		DISTRIBUTION STATEMENT A Approved for Public Release Distribution Unlimited		12b. DISTRIBUTION CODE
13. ABSTRACT (Maximum 200 Words) The Cal Poly Demo (Demo) was established to be a research and demonstration manufacturing activity to support the Defense Logistics Agency (DLA) and the Defense Supply Center, Philadelphia (DSCP). The DLA's Apparel Research Network (ARN) focus for the Demo included several areas of activity. The Demo was directed to study the costs and problems associated with the manufacturing of military apparel items. The Demo factory activity was required to produce commercial as well as military products to meet the DLA objective of shared production. Since the Southern California apparel industry is primarily small businesses producing low volume fashion products, the Cal Poly Demo factory needed to reflect the size and capability of its customer audience to be a credible demonstration to industry. In addition, the DSCP was having difficulty placing certain low volume products on contract with commercial producers. Thus, the Cal Poly Demo factory chose to specialize in producing and studying relatively low volume products such as the Marine men's short sleeve dress shirt, Marine maternity dress uniform and maternity Battle Dress Uniform. Some specific challenges and general issues concerning the manufacturing activity included: 1) use of modular manufacturing as an alternative manufacturing process 2) equipment issues 3) production planning for military and commercial work 4) meeting cash match requirements				
14. SUBJECT TERMS Year 3 Final Technical Report			15. NUMBER OF PAGES 70	
			16. PRICE CODE	
17. SECURITY CLASSIFICATION OF REPORT unclassified	18. SECURITY CLASSIFICATION OF THIS PAGE unclassified	19. SECURITY CLASSIFICATION OF ABSTRACT unclassified	20. LIMITATION OF ABSTRACT	

**Cal Poly Apparel Manufacturing Demonstration -
Year 3 Final Technical Report**
(and additional summary material from Year 1 and 2)

Performance Period: 9/25/95 - 11/30/98

(Proprietary version for DLA-PM)

Date: May 31, 2000

**Apparel Technology and Research Center
California State Polytechnic University, Pomona**

Prepared by ATRC Staff

Foreword

The Cal Poly (CP) Apparel Technology and Research Center (ATRC) was funded by the Defense Logistics Agency's (DLA) Apparel Research Network (ARN) to establish a research and demonstration manufacturing activity. The work of the CP ATRC Demo (Demo) as part of the ARN program, was in support of the DLA and the Defense Supply Center, Philadelphia (DSCP) by:

1. Conducting studies on costs and problems associated with the manufacturing of military garments;
2. Manufacturing military garments the DSCP had difficulty placing with commercial businesses;
3. Recruiting new businesses to become military contractors through an incubator production program; and
4. Transferring the lessons learned in the demonstration factory to industry through an industry advisory committee, a newsletter, a web site and other events and activities.

Results of the Year 3 activities follow in this report.

In addition, individual reports have been completed on the following military items:

- a. Marine men's short sleeve shirt
- b. Marine maternity dress uniform - tunic, skirt, slack
- c. All service maternity Battle Dress Uniform (BDU) - coat and slack

The Cal Poly Demonstration also participated in the DLA Virtual Prime Vendor initiative. This activity was dedicated to making improvements in the DLA Clothing and Textile supply chain. An individual report has been completed for this activity as well.

Reports identified above are posted on the Apparel Research Network (ARN) website at <http://arn.iitri.org> and are titled:

Virtual Prime Vendor Short Term Project T1P1 - QLM/Retail at MCRD-San Diego

- Appendix A - Fort Leonard Wood Site Visit Review
- Marine Maternity Dress Uniform Tunic, Skirt and Slack Final Report
- All Service Maternity Battle Dress Uniform Final Report
- Marine Short Sleeve Shirt Final Report
- Indirect Labor Activity Cost Study for a Sample Military Apparel Contract

Lastly, at the end of this report there appears a summary of lessons learned in establishing and operating an activity of this size and type over the initial three-year base contract period.

Executive Summary

Year 3 Demo Activities

As stated in the Foreword, The Cal Poly Demo (Demo) was established to be a research and demonstration manufacturing activity to support the Defense Logistics Agency (DLA) and the Defense Supply Center, Philadelphia (DSCP). The DLA's Apparel Research Network (ARN) focus for the Demo included several areas of activity.

The Demo was directed to study the costs and problems associated with the manufacturing of military apparel items. The Demo factory activity was required to produce commercial as well as military products to meet the DLA objective of shared production. Since the Southern California apparel industry is primarily small businesses producing low volume fashion products, the Cal Poly Demo factory needed to reflect the size and capability of its customer audience to be a credible demonstration to industry. In addition, the DSCP was having difficulty placing certain low volume products on contract with commercial producers. Thus, the Cal Poly Demo factory chose to specialize in producing and studying relatively low volume products.

Specific issues affecting the military garments of the Marine men's short sleeve dress shirt, the Marine maternity dress uniform (tunic, slack and skirt) and the maternity Battle Dress Uniform are documented in separate reports. These reports are posted on the Apparel Research Network (ARN) web site at <http://arn.iitri.org>.

Some specific challenges and general issues concerning the manufacturing activity included:

- 1) use of modular manufacturing as an alternative manufacturing process
- 2) equipment issues
- 3) production planning for military and commercial work
- 4) meeting cash match requirements

Modular manufacturing was chosen for the Demo factory because it could show industry how to better handle small lots with quicker cycle times and lower inventories of work-in-process. The factory staff hired during Year 2 all came from local industry and only had experience in a progressive bundle environment. The process of migrating the sewing operators to a modular team environment was challenging. During Year 3 Cal Poly Demo staff went through the first two of the typical stages of modular development that includes forming, storming, norming and performing. Many issues were faced in production planning, modular set-up, and choice of type of module.

Overall, implementation of the modular manufacturing method was successful for both the operators and the demonstration factory. The operators enjoyed the challenge of learning new skills, the variety of performing more than one operation all day long, the opportunity to stand up and move around, the ability to see whole garments being completed and being able to contribute more than one operation to the garment. From a production standpoint the factory management staff found production planning, scheduling and control easier. At any given moment it was always easy to tell the number of units a module had completed as hourly records were kept. Customers liked being able to come into the facility and easily see for themselves which module was making their product, how the production was doing against the schedule and how the quality looked from that module.

The factory floor was fully equipped to produce a variety of simple military and commercial sportswear items. Equipment was chosen for flexibility and varying levels of automation where applicable. Automated items were tooled for military items because styles remained fairly constant justifying the investment in tooling. Automation had limited application to commercial styling variability. Tooling expenses were as high as \$5,000 to \$7,500 dollars for a pocket change. With limited cuts of 1,000 units the tooling expense was not justifiable. Industry continued to support the equipment needs of the demonstration floor.

Production scheduling was a challenge due to the variability in military orders. Military orders came on an irregular schedule of varying quantities. Each product was ordered in multiple sizes from the military tariff (the total size range available for the garment). Orders for middle of tariff sizes were fairly close to the contract forecasts but end of tariff size orders deviated greatly from the forecasts. Producing end of tariff product and holding it in inventory did not always guarantee being able to fill an order from finished goods. More specifics on this point are part of the Marine maternity dress uniform report on the ARN web site.

The DLA Demo activity had a cash match requirement in an effort to develop a self-supporting capability for the activity. DLA was concerned that if the Demo's only means of support was from DLA contract funds the activity could not be self-sustaining for the long term. The cash match requirement had both positive and negative aspects to it. The positive was it made the demonstration factory operate more like commercial industry and thus increased the credibility of the factory to industry. The negative was the size of the requirement for a start-up operation. The ATRC produced a very wide variety of products to meet the cash match requirement. A list of the 51 commercial customers and their products produced during Year 3 can be found in Appendix B.

The Demo factory assisted the DSCP with production of hard to procure items. The DSCP was unable to place the items at a commercial producer because of the low volume nature of the work. The items included the maternity Battle Dress Uniform

coat and slack; the Marine maternity dress uniform tunic, slack, skirt and two shirts; two styles of Marine dress uniform skirt; and repairs to Navy trousers. The maternity BDU contract was the one project that had an additional element beyond the production need. The BDU items were used as part of an incubator project to develop a local producer capable of manufacturing the items directly for the DSCP. A Demo Coalition (industry advisory committee) member who had a long-term interest in doing military contract work was the company chosen to be the incubator participant. Results at the end of Year 3 were positive. The Coalition company benefited from the regular production of an item that stayed the same for an extended period of time. The incubator arrangement allowed the company to focus on the production aspects of making the garment before having to deal with the pre-production, sourcing and eventual paperwork requirements of military contract work.

At the time the Demo activity started the DSCP had very few West Coast companies amongst their vendors. The Demo worked very actively during Year 3 to recruit apparel businesses on the West Coast to become military contractors for the DSCP. In 1996, recruitment efforts were small due to the start up process as well as the staff's limited knowledge in military contracting. Due to an increase in marketing, 1997 figures more than doubled. In 1998, the apparel industry, now aware of the presence of the ATRC and its credibility, increased their interest in military contracting. As time went on, an increasing number of firms returned CAGE Code applications as a first step to becoming a military contractor.

Year	Packets Disbursed	Applications sent by ATRC	Applications Sent by Company
'96	10		1
'97	49	3	2
'98	105	13	1

Additionally, the Demo was charged with transfer of information about the Demo activity to industry. The DLA was interested in communicating the lessons learned at the Demo that benefited both military and commercial production in the Demo factory as well as industry at large. Working with an industry advisory committee (Coalition) was key to transferring information as well as developing support from industry for the Demo activity. The Coalition had 56 members and three working groups with active projects of benefit to industry. In addition, the Demo published a newsletter, maintained a website, distributed information packets/ brochures/ flyers, attended trade shows/industry events/meetings, hosted tours of the Demo factory, hosted industry/vendor/customer events, and developed relationships with industry and support organizations

An area of activity added to the Demo's program of work in March of 1997 included involvement in the DLA/DSCP initiative of Virtual Prime Vendor. This project area

was dedicated to making improvements in the government Clothing and Textile supply chain through total asset visibility, changes in the ordering and manufacturing activities to a "balanced flow" operational scenario, and significant inventory reduction. The first step in the process was to make improvements at the retail customer. The Marine Corp Recruit Depot - San Diego was selected for the initial work at retail. Complete documentation of the MCRD- SD and Ft. Leonard Wood activity from March 1997 to the Fall of 1999 are documented in the ARN research report of VPVT1P1 which can be found on the ARN web site at <http://arn.iitri.org>. Overall, the project realized the desired results for both San Diego and the Virtual Prime Vendor initiative. Other areas of activity included work at the wholesale level and the Defense Apparel Manufacturers (DAMs) level. The Cal Poly Demo was involved in project coordination and/or technical work in varying aspects in all three areas.

Lastly, at the end of this report appears a summary of the "lessons learned" in establishing and operating an activity of this size and type over the initial three-year base contract period. This section documents areas other than specific programmatic activities such as space, budget/cash match requirements, staffing, business plan requirements, institutional infrastructure support, developing industry support and reporting.

Table of Contents

Foreword	2
Executive Summary	4
1.0 Introduction	11
1.1 Background and Objectives	11
1.2 Scope and Methodology	12
2.0 Manufacturing Activity	13
2.1 Introduction	13
2.2 Modular Manufacturing Experience	14
2.3 Equipment/Software Issues	19
2.4 Production Planning	20
2.5 Cash Match Requirements	20
3.0 Hard to Procure Products	22
3.1 Introduction	22
3.2 Hard to Procure Items Produced by the Demo Factory	22
3.3 Maternity BDU Contract – Incubator Project	23
3.4 Summary	24
4.0 Military Contractor Recruitment	25
4.1 Introduction	25
4.2 Methods of Recruitment	25
4.2.1 Recruitment Materials	25
4.2.2 Recruitment Presentations	25
4.3 Application Process	26
4.4 Direct Assistance	26
4.4.1 DSCP Not in Receipt of Application	26
4.4.2 Incorrect CAGE Code	26
4.4.3 Difficulty Getting Paid	26
4.4.4 TeleSpecs Not Answering	27
4.5 Results	27
5.0 Information Dissemination to and Interaction with Industry	28
5.1 Introduction	28

5.2	Information Provided to Industry	28
5.2.1	Newsletter	28
5.2.2	Web Site	28
5.2.3	Information Packets/Brochures/Flyers	29
5.2.4	Publicity/Publications/Presentations	30
5.2.5	Wall Visuals	30
5.2.6	Tours/Contacts with Industry	30
5.2.7	Seminars	31
5.2.8	Training	31
5.2.9	"The Source"	31
5.3	Interaction with Industry	32
5.3.1	Coalition	32
5.3.1.1	Increase Membership	32
5.3.1.2	Restructure	33
5.3.1.3	Identify and Perform Services Industry Needs	33
5.3.2	Increase Vendor/Customer/Donor Relationships	34
5.3.3	Develop Relationships with Industry and Support Organizations	35
5.3.3.1	Events	35
5.3.3.2	Meetings	35
5.3.3.3	Plant Visits	35
5.3.3.4	Trade Shows	36
5.3.4	Service to the Apparel Merchandising & Management degree program and the University	36
5.4	Develop Goldmine Database and Document Interaction	36
6.0	Virtual Prime Vendor	37
7.0	Establishment of a Demonstration Project – Lessons Learned	39
7.1	Introduction	39
7.2	Staffing	39
7.3	Budget Issues/Cash Match Requirement	40
7.4	Business Plan	40
7.5	Satisfying Space Needs	41
7.6	Institutional Infrastructure Support	41
7.7	Support from the Technology Vendors	41
7.8	Response from Industry	41
7.9	Reporting Requirements	42
8.0	Summary and Future Plans	43

Appendices	44
A. Glossary	45
B. List of Products Made at ATRC Demo	47
C. Equipment List	51
D. How to Become a Military Contractor	54
E. Military Contractor Recruitment Results	57
F. List of Published Articles about the ATRC	63
G. Coalition Members	65
H. ATRC Structure	68

1.0 Introduction

This report is for the Year 3 Cal Poly Demo activities (with additional summary information concerning the Year 1 and 2 activity).

1.1 Background and Objectives

As stated in the Foreword, The Cal Poly Demo (Demo) was established to be a research and demonstration manufacturing activity to support the Defense Logistics Agency (DLA) and the Defense Supply Center, Philadelphia (DSCP). The DLA's Apparel Research Network (ARN) focus for the Demo included several areas of activity.

The Demo was directed to study the costs and problems associated with the manufacturing of military apparel items. The Demo factory activity was required to produce commercial as well as military products to meet the DLA objective of shared production. Since the Southern California apparel industry is primarily small businesses producing low volume fashion products, the Cal Poly Demo factory needed to reflect the size and capability of its customer audience to be a credible demonstration to industry. In addition, the DSCP was having difficulty placing certain low volume products on contract with commercial producers. Thus, the Cal Poly Demo factory chose to specialize in producing and studying relatively low volume products.

At the time the Demo activity started the DSCP had very few West Coast companies amongst their vendors. The Demo worked very actively during Year 3 to recruit apparel businesses on the West Coast to become military contractors for the DSCP.

Additionally, the Demo was charged with transfer of information about the Demo activity to industry. The DLA was interested in communicating the lessons learned at the Demo that benefited both military and commercial production in the Demo factory as well as industry at large. Working with an industry advisory committee (Coalition) was key to transferring information as well as developing support from industry for the Demo activity.

An area of activity added to the Demo's program of work in March of 1997 included involvement in the DLA/DSCP initiative of Virtual Prime Vendor. This project area was dedicated to making improvements in the government Clothing and Textile supply chain through total asset visibility, changes in the ordering and manufacturing activities to a "balanced flow" operational scenario, and significant inventory reduction.

Lastly, at the end of this report appears a summary of the "lessons learned" in establishing and operating an activity of this size and type over the initial three-year base contract period. This section documents areas other than specific programmatic activities.

This report documents both programmatic and general tasks associated with operating the demonstration activity during Year 3 of the contract.

1.2 Scope and Methodology

This report covers the Year 3 time period of December 1, 1997 through November 30, 1998. In addition, three separate garment reports and the separate VPVT1P1 report on the Virtual Prime Vendor activity also cover this time period.

"Lessons learned" at the end of this report are documented as a result of experiences or issues and their associated resolutions in performing government contract work. These cover from 9/26/95 - 11/30/98.

A glossary of terms and acronyms appears as Appendix A.

2.0 Manufacturing Activity

2.1 Introduction

The Cal Poly Demonstration factory was responsible for studying all aspects of military garment production while also producing commercial items in the same production facility. The desired outcome for this "shared production" environment was that lessons learned in producing commercial items would hopefully benefit military item production and vice versa.

Specific issues affecting the military garments of the Marine men's short sleeve dress shirt, the Marine maternity dress uniform (tunic, slack and skirt) and the maternity Battle Dress Uniform are documented in separate reports. These reports are posted on the Apparel Research Network (ARN) web site at <http://arn.iitri.org>.

During Year 3 the Demo factory produced a variety of both military and commercial products. The Demo challenged itself by working with a variety of casual sportswear items and military items that were all small lots of between 600 - 1200 units on average. Some products required sewing labor only and some products were full package projects including sourcing, patternwork, spreading, cutting, bundling, sewing and finishing. The goal was to determine if the Demo could be successful with smaller lot manufacturing, be a credible demonstration to industry and at the same time meet the cash match requirements of the contract.

Initially the Demo factory floor faced several challenges in accommodating customers' production requirements and business practices. Initially the ATRC received requests for a very wide variety of products at varying levels of complexity, some requiring specialized equipment and sewing skills. Because the focus of the ATRC was on small-lot manufacturing and there was a requirement to generate cash match, the ATRC needed to limit work to items that were easy to set up and were within the skills and capabilities of the majority of the ATRC workers. As time went on, the ATRC became more adept at soliciting work that was a good match for ATRC capabilities and objectives.

Many ATRC customers were small businesses used to informal, verbal ordering arrangements. In order to manage all of its orders accurately and efficiently and at the same time expose its customers to more sophisticated business methods, the ATRC spent considerable time working with customers to familiarize them with written documentation for specifications and orders.

A list of the 51 commercial customers and their products produced during Year 3 can be found in Appendix B.

Some specific challenges and general issues concerning the manufacturing activity included:

- 1) use of modular manufacturing as an alternative manufacturing process
- 2) equipment issues
- 3) production planning for military and commercial work
- 4) meeting cash match requirements

2.2 Modular Manufacturing Experience

The Cal Poly Demonstration activity needed to identify specific military and commercial items that it could develop a satisfactory model demonstration factory for. Low volume military and commercial items were chosen for several reasons. Several low volume military items were difficult for the DSCP to place at commercial contractors and the California apparel industry typically produced lower volume fashion products. In addition, the majority of California industry was relatively small businesses unable to afford investments in sophisticated automation. The majority of California apparel businesses had been operating by the progressive bundle system (PBS) that is based on the economies of scale for high volume production. Generally PBS has a longer work-in-process (WIP) time of 4-6 weeks or longer.

Modular manufacturing was chosen for the Demo factory because it could show industry how to better handle small lots with quicker cycle times and lower inventories of WIP. Technology investments to improve manufacturing operations can come in the form of hard or soft technologies of hardware/software, process or people improvements. With modular manufacturing focusing on greater capability through people and process, the demonstration could be more realistic and viable for industry to consider for adoption.

The principles of modular manufacturing include:

1. Set-up of all equipment necessary to complete the entire assembly of a single garment (or a sub-assembly of a single garment) into a U-shape work unit. The premise for modular manufacturing is complete unit processing instead of the single operation processing found in PBS.
2. Operators in the module are cross-trained and work as a team to keep the production moving at the required rate. All operators can work at more than one workstation and move from station to station as required to keep

production moving forward. PBS operators wait for work to be delivered to them and may have "wait" time with no work.

3. The team is responsible for meeting production requirements to stay on schedule and to meet quality requirements as an in-line process, not an end of the line process handled by others.

Many major industries worldwide use some form of modular manufacturing and call it by several names such as cellular manufacturing, flexible manufacturing, or Just-In-Time (JIT) manufacturing. The automotive industry is a prime example of JIT implementations.

Typical results achieved in modular manufacturing follow:

	<u>PBS</u>	<u>MODULAR</u>
OPERATOR UTILIZATION	80%	100%
THROUGHPUT (DAYS)	12 - 15 DAYS	1 - 5 DAYS
SQUARE FEET/OPERATOR	75 - 110	55 - 65
QUALITY-AQL	4 - 6%	1 - 2.5%
LABOR COST PER UNIT		EQUAL OR LOWER
LABOR TURNOVER	50 - 60%	20 - 40%
ABSENTEEISM	5%	2 - 4%
DIRECT LABOR EXCESSES	5 - 15%	1 - 6%
INDIRECT LABOR RATIO	20 - 30%	10 - 15%
EMPLOYEE ATTITUDE	COMPETITIVE	COOPERATIVE
RESPONSE CAPABILITY	POOR	EXCELLENT
CUSTOMER SERVICE	POOR	EXCELLENT
FLEXIBILITY	POOR	EXCELLENT

The factory staff hired during Year 2 all came from local industry and only had experience in a progressive bundle environment. The process of migrating the sewing operators to a modular environment was challenging. Cal Poly Demo staff went through the first two of the typical stages of modular development that includes forming, storming, norming and performing during Year 3.

The first task of forming involved developing additional sewing skills, as most operators only knew one machine and one type of operation. With the additional skill training came the change to stand-up workstations and moving amongst the workstations as the garment work required. Some of the operators advanced quickly in the development of their skill level and others were much slower. Moving operators from one module to another to find the best fit for each operator and team was one of the typical challenges in the forming stage.

The storming stage was very difficult for many. This involved developing the communication component of working as a team. Making the teams be responsible for quality and their own repairs was new to all. The use of team meetings and team forms for reporting performance, issues, problems, and resolutions was also new to all and required a lengthy learning curve period for people to feel comfortable (six months). The storming stage is often the most difficult of the four stages.

Norming and performing were not reached during Year 3 but are expected to be completed during Year 4. Norming involves consistent, systematic team functioning. Performing occurs when the team is focused on performance after all interpersonal and training issues have been resolved and overcome.

As indicated in Section 2.1, the large variety of low volume commercial and military products produced presented some specific challenges to the factory floor including such things as:

1. Scheduling production - At the beginning of Year 3 an entire cut of work from a customer was booked to one single module to control thread costs and for quality control purposes. Processing for the entire cut took longer but one module was entirely responsible for all work to that cut. During Year 3 the decision was made to split cuts between two modules. This was done by color to control thread costs and to maintain quality control accountability. Net positive effects were shorter cycle times to complete the cuts and healthy competition amongst the teams as a group and individuals within the teams.
2. Set-up of teams - The factory operated four sewing modules complete with finishing at the beginning of Year 3. During the year quite a bit of commercial work required garment washing in between the sewing and finishing. The finishing activities in each module were removed and a separate finishing module was set-up. This proved to be much more efficient in dealing with the garment wash items. After the garment wash production concluded in the factory the separate team was maintained to determine if it could be as effective as the previous arrangement. Overall, use of the finisher's time was greatly improved and the one finishing team was very capable of handling work from all four modules.

3. Type of module - Three of the four modules were set-up as modified kan ban modules to handle cuts with more units in the lot size. The kan ban system was designed to facilitate completion of work by constraint management. The operation that took the longest dictated how the operators would move the work through the module to achieve the hourly production goal. These modules had five to six operators consistently working in the same team. Production of these cuts usually required several days in the factory and allowed the operators to develop more of a skill level because enough units were produced. The larger cuts were easier to schedule for several months at a time.

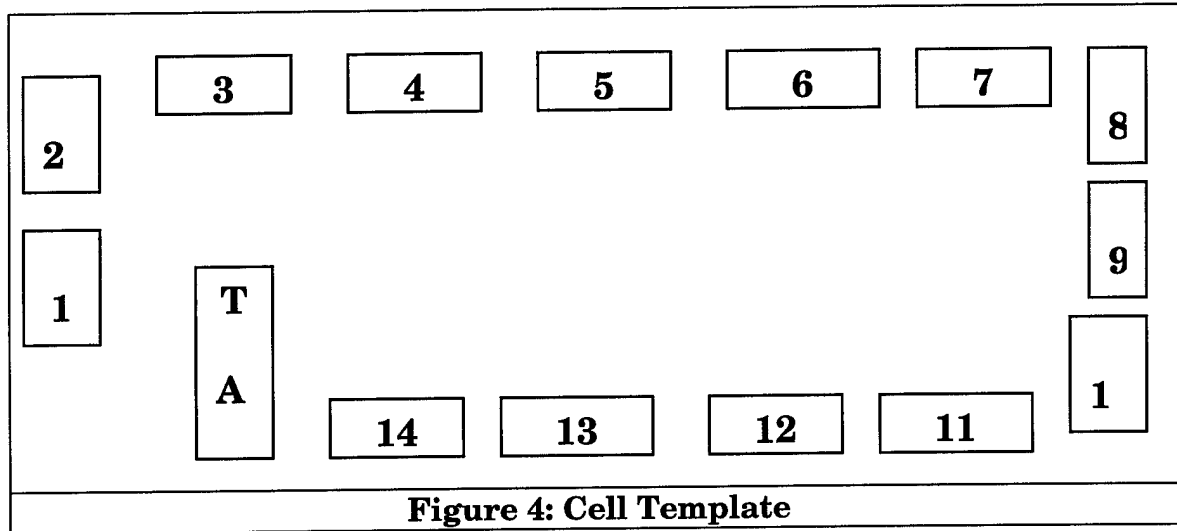
The fourth module was set-up as a modified Toyota Sewing System (TSS) module with only one or two operators working in the team. This module was used for extremely low volume orders such as lots of two to twenty units or sample making. The TSS method literally walks a garment through the module one unit at a time and thus completes production as quickly as possible. Such extremely small lots allow no opportunity to build skill level so the TSS method facilitated getting this type of work completed and shipped in the most time effective manner. The operators that worked in the TSS module were the most skilled of ATRC factory floor staff.

The set-up of the module /operation of the team for the Marine short sleeve shirt is shown as an example below:

Work Cell Setup – The technician arranges the machines based on the following equipment table and the work cell template. The sewing operators assist with machine adjustment and open the bundled parts.

Table 15: Equipment Table		
Location #	Machine Description	MFE Name
1	Micro Promstitcher	Ideal - #6833
2	Turning	Lunapress - # CP-323S
3	Single Needle	Singer # 591 – D300G
4	Double Needle	Juki – LH – 3178
5	Pocket (automated)	Durkopp - # 805
6	3/t Overlock	Yamato - #25016
7	Single Needle	Juki - #DDL 555-4
8	Single	Juki - #DDL-555ON - 3
9	5/t Overlock	Brother - #MA4-V61-95-5
10	Single Needle	Juki - DDL-555ON-7
11	Single Needle	Juki - #DDL-541ON-7

12	Button Hole	Juki - #LBH-783
13	Button	Juki - BR10
14	Bar Tack	Juki - #LK3-B430E-2



Operator	Operates Machine #'s	Operate Machine #'s as needed	Level of Proficiency
A	1, 2, 3	12, 13	90%
B	4, 5	12, 13, 14,	100 %
C	6, 7	13, 14	90%
D	8	7, 12, 14	95%
E	9	12, 13,	85%
F	10, 11	7, 12,13,	100%

Module Capacity

Number of Operators	Units per Hour	Units per Day	Units per Week
6	12	96	480

Overall, implementation of the modular manufacturing method was successful for both the operators and the demonstration factory. The operators enjoyed the challenge of learning new skills, the variety of performing more than one operation all day long, the opportunity to stand up and move around, the ability to see whole garments being completed and being able to contribute more than one operation to the garment. From a production standpoint the factory management staff found production planning, scheduling and control easier. At any given moment it was

always easy to tell the number of units a module had completed as hourly records were kept. Customers liked being able to come into the facility and easily see for themselves which module was making their product, how the production was doing against the schedule and how the quality looked from that module.

With the implementation of the modular process to small lot manufacturing came the opportunity for general process improvements in the above shop floor areas. The amount of information associated with each order, be it military or commercial, was extensive. Demo factory staff spent the last half of Year 3 evaluating opportunities for improvement and implemented several new procedures for handling the associated information. This included use of centralized repositories for information, use of new internal forms, clarified lines of communication, and new procedures for making sure information was available to all appropriate parties.

2.3 Equipment/Software issues

The Electronic Data Interchange (EDI) set-up with the DSCP was completed during Year 3. As a result the Cal Poly Demo received delivery orders for both the Marine men's shirt and the Marine maternity dress uniform items by EDI. DLA/DSCP had an ongoing initiative to move their vendors to an electronic commerce environment whereby they would receive orders through EDI. The use of EDI was important to DLA/DSCP because it reduced the time delays caused by use of the U.S. Mail as the official means to send delivery orders to the military contractors.

The factory floor was fully equipped to produce a variety of simple military and commercial sportswear items. Equipment was chosen for flexibility and varying levels of automation where applicable. Automated items were tooled for military items because styles remained fairly constant justifying the investment in tooling. Automation had limited application to commercial styling variability. Tooling expenses were as high as \$5,000 to \$7,500 dollars for a pocket change. With limited cuts of 1,000 units the tooling expense was not justifiable.

Equipment for the factory was provided by industry on a donation or loan basis. Only the Profile Stitcher and the Luna Press were purchased with special State grant funds. A full list of equipment can be found in Appendix C.

The Lectra cutter was cycled out and a new cutter put in its place. While overall coordination with Lectra in the past had been very good, the Demo was without a cutter for over two months during this rotation cycle. As a result the Demo had to use manual cutting during the interim.

Also see Section 7.7 for more information.

2.4 Production Planning

Production scheduling was a challenge due to the variability in military orders. Military orders came on an irregular schedule of varying quantities. Each product was ordered in multiple sizes from the military tariff (the total size range available for the garment). Orders for middle of tariff sizes were fairly close to the contract forecasts but end of tariff size orders deviated greatly from the forecasts. Producing end of tariff product and holding it in inventory did not always guarantee being able to fill an order from finished goods. More specifics on this point are part of the Marine maternity dress uniform report on the ARN web site.

Unpredictability of military orders had an impact on scheduling commercial orders. Commercial work was booked for the factory to meet cash match requirements. In some instances the factory ended up overbooked because more military orders than anticipated arrived. Also see the next section.

2.5 Cash Match Requirements

The DLA Demo activity had a 2:1 cash match requirement. This meant that for every \$2 of DLA funding, the Demo was required to generate \$1 of independently derived revenue either from internal Cal Poly contributions or external income from the sale of commercially manufactured products, meeting and seminar registration fees or industry cash donations to the Demonstration. There were two principal reasons for this requirement:

1. This requirement meant that Cal Poly had to make a serious commitment to the success of the Demo rather than being a passive recipient of government funding.
2. The requirement encouraged the Demo to develop a self-supporting capability that would make it more credible to the community it was trying to serve while insuring the long-term future of the facility.

The original Demo plan to produce the required cash match depended heavily on the existence of the Demo factory to generate this additional income. What was not anticipated in this plan was the length of the start-up period when the factory was under construction and therefore unavailable to meet the cash match requirement. As a result, the Demo was forced to produce almost 85% of the \$1.5 million in cash match during the final 18 months of the original three-year contract.

The Demonstration was able to accomplish this by redirecting its focus to developing innovative ways of attracting commercial customers. As a DoD funded R&D activity, the Demo was constrained against direct competition with commercial firms. This meant that the Demo could not use traditional means of attracting customers such as advertising, direct mail, etc. As a result, the

Demonstration developed a strategy that included educating local industry about the ATRC capabilities through newsletters, articles in local news publications, factory tours and encouraging firms to participate in ATRC activities such as the Coalition, seminars, and military contractor recruitment.

A total of 51 commercial customers generated over \$725,000 of the required cash match (including both direct and indirect monies). Twenty-four of the customers were on-campus organizations demonstrating the commitment of Cal Poly to support the start-up factory. However, the bulk of commercial business came from twenty-seven commercial apparel firms who generated 94% of the factory income. These firms represented a wide range of apparel manufacturers and demonstrated the viability of the commercial manufacturing capabilities of the Demo.

Detailed information on products manufactured for the University customers is listed in Appendix B. Due to the proprietary nature of information on manufacturing done for outside commercial customers, an abbreviated list of products and quantities produced is included.

Staff had to work very hard to meet this very large requirement.

Also see Section 7.3 for more information.

3.0 Hard to Procure Products

3.1 Introduction

Part of the mission of the Demonstration was to provide assistance to the DSCP when it had difficulty placing an item(s) on contract with a commercial producer. The difficulty usually came from the item being low volume and/or unusual in its construction. Assistance to the DSCP took various forms as described below.

3.2 Hard to Procure Items Produced by the Demo Factory

During Year 3 the Demo factory produced the following products for the DSCP most of the year and are reported on in detail in the separate garment reports identified in the Foreword:

- 1) Maternity Battle Dress Uniform (BDU) contract - started Feb 98
- 2) Marine maternity dress uniform contract- tunic, slack and skirt

The Demo also assisted the DSCP with the production of four items through small purchase orders:

- 1) Marine dress uniform skirts - 2 styles
- 2) Marine maternity shirts - 2 styles

The Marine dress uniform skirts were produced over a four-month period of 9/98 to 1/99 because of immediate sourcing needs. A total of 420 dark blue skirts and 1,620 khaki green skirts were completed.

At the end of Year 3 all the pre-award activity and most of the pre-production activity was completed for the two shirts. Actual production did not take place until the beginning of Year 4.

Additionally, the Demo factory completed repairs on the following item through a small purchase order:

- 1) Navy trousers

The Navy trousers were in need of replacement of the button at the center front of the waistband and on the hip pocket. The pants were a stark white fabric and the button had a pinkish tinge appearance next to the color of the fabric. 19,427 units were completed in a three-month period of 5/98 to 8/98. These items came from the Ontario, California Navy warehouse and were returned to the same location.

Lastly, the Demo factory developed pricing information for the DSCP on the following items:

- 1) Marine maternity dress uniform jumper
- 2) Marine uniform caps -women's

DSCP did not pursue production of these items with the Cal Poly Demo.

3.3 Maternity BDU Contract - Incubator Project

The maternity BDU contract was the one project that had an additional element beyond the production need. The BDU items of coat and slack were used as part of an incubator project to develop a local producer capable of manufacturing the items directly for the DSCP. A Demo Coalition (industry advisory committee) member who had a long-term interest in doing military contract work was the company chosen to be the incubator participant.

The time frame for the project would be 18 - 24 months in length. The company was a sewing contractor and would have to develop the additional in-house capability to become a full package contractor. During the first months of the project, the incubator company focused all its attention on developing its production capability. The Demo completed all patternwork, sourcing, cutting, bundling, shipping and invoicing for the maternity items up through the end of Year 3

Plans for Year 4 included the incubator company assuming the patternwork, sourcing, cutting and bundling tasks. This would require an investment in technology and creation of new positions. In addition, the DSCP would release a full solicitation for the items and the incubator company would respond with a technical proposal. Award of the contract would occur after January 2000. Hopefully, the incubator company would win this award because of their experience with the items.

The contract was awarded to the Cal Poly Demo and Company X in January 1998. At start-up of the contract, the Demo provided all systems and processes for the BDU contract, excluding Sewing, Finishing and Inspecting. Company X at the beginning of start-up and for the following nine months, until September 1998, performed only the sewing, finishing and inspecting processes. Then, Company X acquired an automated cutting system and took over the process of cutting for the BDU contract. During the Demo's Year 4, the goal of the incubator program was for Company X to be completely independent from the Cal Poly Demo and be fully awarded the BDU contract in the late Fall of 1999.

Results at the end of Year 3 were positive. The Coalition company benefited from the regular production of an item that stayed the same for an extended period of time. The incubator arrangement allowed the company to focus on the production aspects of making the garment before having to deal with the pre-production, sourcing and eventual paperwork requirements of military contract work.

3.4 Summary

The Demo successfully assisted DSCP in the areas of Hard to Procure Products by providing a full range of capabilities including:

1. Full Production Garment Manufacture
2. Repair of Substandard Garments
3. Cost Estimates
4. Identification, Recruitment and Training of Qualified Subcontractors

Particularly successful was the incubator project, which provided DSCP with not only the product that was needed, but also a new manufacturing resource that DSCP did not previously have. The Demo manufacture of the Marine maternity dress items was so successful that DSCP continued to issue purchase orders for these items to the Demo well after the original demonstration was complete.

4.0 Military Contractor Recruitment

4.1 Introduction

The original intention of this activity was to fulfill the contract obligation of assisting the DSCP in generating a supplier base of small West Coast apparel companies that would support military readiness and improve the cost, quality, and delivery of military uniform items to DSCP customers.

Recruitment efforts by the ATRC were initiated by convincing companies of the benefits of becoming a military contractor, such as an increase in their sales and the potential for repeat business. Assistance included all of the listed activities that follow.

4.2 Methods of Recruitment

4.2.1 Recruitment Materials

Considerable time was spent in the research and review of materials that were applicable in acquainting the apparel industry with the benefits of doing business for the military and how to get started. During Year 1 through Year 3, knowledge on "How to Become a Military Contractor" was acquired by information on the Internet, recruitment information issued by the DSCP Small Business Office and contact through DSCP Procurement Analyst, Mary Ann Farrell. Selected materials were then gathered, printed and collated for an informational packet, which was mailed to industry upon request and distributed during informational presentations (see Appendix D).

4.2.2 Recruitment Presentations

The ATRC hosted informational presentations in Year 2 and 3. Flyers were prepared and mailed to the general ATRC database, room and set up arrangements were coordinated, as well as reservations, parking arrangements and materials to be distributed. A presentation on "How to Become a Military Contractor" was held on 04/30/97, attended by 61 and again on 07/21/98, attended by 48. Attendees represented various companies in the apparel industry, i.e., sewing contractors, manufacturers, cutting and marking contractors, dyeing and washing services, textile companies and embroidery services. DSCP Procurement Analyst, Mary Ann Farrell, was the guest speaker for both presentations and gave a very well rounded view of doing business with the military. The presentations proved to be a great method for initially pulling in companies truly interested in military contracting. A workshop on how to complete the applications to receive a CAGE code and to get on the list to receive solicitations was offered by the ATRC on 02/23/99 of which 8

apparel companies attended. Additionally, the small fee that was charged for the workshop was contributed to cash match.

4.3 Application Process

Once a company determined their sincere interest in becoming a military contractor, an application was completed to request the assignment of a Commercial and Government Entity (CAGE) Code and an application to be placed on the Solicitation Mailing List. The ATRC provided assistance in the completion of the applications and was responsible in forwarding the applications to the DSCP for processing. Since the DSCP does not correspond with applicants, the ATRC took the responsibility of obtaining the code and once issued, contacted the companies to advise them of their number. This procedure required the tracking and maintenance of data.

4.4 Direct Assistance

Assistance was made available for companies experiencing various problems and their results are important to note.

4.4.1 DSCP Not in Receipt of Applications

Some original applications were never received, even though the mailing address was correct. Applications were then mailed directly to a Product Executive who confirmed their receipt and then forwarded them on for processing.

4.4.2 Incorrect CAGE Code

Codes that were verbally received from DSCP personnel did not match the codes in the Defense Logistics Information Service (DLIS). CAGE codes are now retrieved only through the DLIS.

4.4.3 Difficulty Getting Paid

One of our companies had problems receiving payment. Several calls were made, several representatives were contacted and information proved to be inconsistent. Of the representatives that were contacted, many did not even return a phone call. This was very frustrating to the contractor to the point of not wanting to continue doing business with the military. A contracting officer located the problem and the lines of communication were then open. The difficulty was in finding the right person to talk to.

4.4.4 TeleSpecs Not Answering

Companies are advised that they should make samples of the items they are interested in producing and to coordinate their sourcing prior to receiving a solicitation. The number listed for TeleSpecs, which is said to be available 8:00 am to 8:00 pm (Eastern Time), Monday through Friday, has never answered. Several companies contacted the ATRC frustrated, as they had been calling all week. It is advised that the companies mail or fax in their orders.

4.5 Results

In 1996, recruitment efforts were small due to the start up process as well as the staff's limited knowledge in military contracting. Due to an increase in marketing, 1997 figures more than doubled. In 1998, the apparel industry, now aware of the presence of the ATRC and its credibility, increased their interest in military contracting.

Year	Packets Disbursed	Applications sent by ATRC	Applications Sent by Company
'96	10		1
'97	49	3	2
'98	105	13	1

One of the ATRC Coalition members became a military subcontractor through an incubator project with the ATRC for the production of the maternity BDU items. This same company also became a prime contractor to DSCP for the production of coveralls.

5.0 Information Dissemination to and Interaction with Industry

5.1 Introduction

The Demo was required to develop and distribute information on advanced apparel manufacturing and technology as well as services provided by the Demo. The media used to accomplish this task included the ATRC newsletter, web site, publications and tours. The Coalition, an industry advisory group, was a mechanism by which the apparel pipeline gathered to share information, develop and actively work on projects important to the industry. The following section reports on the status of the Coalition, committee activity and membership efforts, the Coalition newsletter, interaction with industry groups/associations and fostering relationships with donors of equipment and supplies, vendors and customers.

5.2 Information Provided to Industry

5.2.1 Newsletter

The ATRC newsletter was developed in the Spring of 1996 to provide information to the apparel community on the objectives and activities of the ATRC. Some of the topics covered in the newsletter were:

- ATRC Activities
- Coalition News
- Educational Opportunities
- News from the Factory
- The Source
- Military Contracting

The newsletter was produced semi-annually and was distributed to approximately 7,000 organizations involved in the apparel industry. It was also available on the ATRC web site. The newsletter has contributed to industry awareness of the ATRC. There was a noticeable increase in inquiries to the Center after each publication.

5.2.2 Web Site

The ATRC Web Site was established during 1996. Based on the growth of the ATRC and information learned about the needs of the ATRC's user community the web site was completely redesigned and expanded during 1998.

- New pages created included:
 - Apparel Research Committee Conference Highlights
 - How to Become a Military Contractor
 - Calendar updates
 - Garment Contractors Association meetings
 - L. A. Trade Tech College summer series
 - Apparel-related trade shows
 - "Resources" was added listing resources available to the industry
 - "Articles" was added listing articles by or about the ATRC
 - "Ready to Export" was added from the Small Business Development office
 - Apparel industry information was provided from the Office of Foreign Investment
 - Newsletters were added
 - Coalition Highlights were added
- New links of interest to the apparel industry were added
- A link to the ATRC site was made from Apparel Industry Magazine
- Personnel updates were maintained

The Center started getting on-line requests for ATRC-specific information as well as requests for general information about the industry.

"The Source" resource database resides on the ATRC website and is explained in further detail in Section 5.2.9 of this document.

The ATRC Web Site is <http://atrc.age.csupomona.edu>.

5.2.3 Information Packets/Brochures/Flyers

As a means to disseminate information about the ATRC and its services, packets, brochures and flyers were developed and maintained.

- Information packets were mailed to individuals as requested or as a means to pique interest in the Center.
- Flyers were distributed to the campus community concerning products available through the Center.
- Pocket-sized brochures were developed and printed to substitute for information packets when possible.

The Demo factory obtained work from the campus community and the packets helped explain what the ATRC was about to interested companies. Several companies visited the Center as a result of receiving a requested information packet.

5.2.4 Publicity/Publications/Presentations

In an effort to make the apparel industry aware of the ATRC and its services, publicity, publications and presentations were used as an important tool.

Approximately 13 articles were published about the Center or where ATRC experts were used as those interviewed. A list of the published articles appears in Appendix F.

The volume of incoming calls and tours increased dramatically after a major article had been published.

5.2.5 Wall Visuals

These were developed and displayed to visually describe what occurs at the demonstration site factory. This included such items as:

- Completed apparel items - displayed in the factory and in the conference room
- Pictures of visitors on tour - on walls in the office area hallway and foyer
- Pages of catalogs showing products manufactured in the Demo factory - in the office area foyer

5.2.6 Tours/Contacts with Industry

During Year 3, the ATRC demonstration site factory provided first-time tours to over 350 individuals. (Return visits are not included.) For a breakdown of the number of those touring the Center, along with related percentages, see below:

Type	Amount	Percentage
Contractor/Manufacturer	169	48%
Other apparel-related (Retailer, Service Provider, Supplier, Textile)	79	22%
College/University-related	46	13%
General public	54	15%
Government-related	6	2%
Totals	354	100%

5.2.7 Seminars

Due to the lack of interest shown by industry during the ATRC start-up, other than in the military recruitment activity, no other seminars were offered during Year 3.

During Years 1 and 2 the following seminars were offered:

- Theory of Constraints - July 1996
- Product Costing - October 1996
- Modular Manufacturing - February 1997
- Fundamentals of Apparel - February 1997
- Quality Control - March 1997
- Product Costing - June 1997

5.2.8 Training

During Year 3, effort was expended in the investigation of possible opportunities for apparel companies to benefit from the Employment Training Panel (ETP). ETP is a source of monies from the State Unemployment Insurance Fund for upgrade training of employees at manufacturing businesses. Since the apparel industry in California is so large, it is a major contributor to this fund but to date had had little exposure to this funding opportunity. The ATRC felt it could facilitate apparel companies access to this source of support. Activities included:

- Wally Aguilar from the Employment Training Panel met with Jean Gipe and Tania Tolmasov at the ATRC
- A meeting among Wally Aguilar of ETP, DaRue and Lunada Bay was arranged by and held at the ATRC
- Jean Gipe attended an ETP orientation meeting
- Tania Tolmasov attended an ETP orientation meeting
- Encouragement and follow-up with DaRue and their funding for synchronous manufacturing was conducted through the ATRC

5.2.9 "The Source"

"The Source" is an on-line sourcing database guide for the apparel industry, which was requested by the ATRC Coalition. The ATRC attempted in Year 3 to use this as a cash-match endeavor as well as assist the apparel industry in its sourcing needs.

- Meetings were conducted with the consulting firm and the Coalition to determine the five segments and how they would be divided to search the database

- The web site development and search mechanisms were completed and the site was posted on the Internet in March
- Brochures were created and mailed to the database
- Enrollment packets were created and mailed by request
- Telephone calls were made to individuals requesting enrollment information
- "The Source" was shown and explained at both Knit West and the LA Textile Shows
- Additional funding was requested from the State of California
- Minor programming errors were corrected by ATRC staff
- Free enrollments were offered to Coalition members, apparel associations, and ATRC vendors/suppliers

35 companies have listed with "The Source." One company indicated to Demo staff that they had obtained work from their listing.

Demo staff feels strongly that, although this effort will take time, it will eventually be a source of income for the ATRC and help the industry.

5.3 Interaction with Industry

5.3.1 Coalition

The Coalition is comprised of executives from all areas of the apparel industry. The members of the Coalition in conjunction with ATRC staff determine visionary projects that serve the best interests of industry.

During Year 3, it was the goal of the ATRC and the current Coalition members to:

- increase membership
- restructure
- identify and perform services industry needs

All were interested in the group being larger and more of a working group than an advisory group. These goals have been met and were accomplished in the following ways:

5.3.1.1 Increase Membership

At the beginning of Year 3, the ATRC had 47 members on the Coalition. By the end of Year 3, membership had increased to 56. That was an increase of 19%.

This was accomplished by Coalition member's referrals, by actively researching companies written up in trade journals, the Internet and as a result of ATRC tours.

These people were asked to participate in a Coalition meeting as a guest and were then recruited as members.

5.3.1.2 Restructure

It was the decision of Coalition members to meet more often and to work on projects that were beneficial to the industry. That Coalition members would want to contribute more speaks very well for the ATRC. The Coalition was, therefore, restructured to meet every other month, instead of once a quarter. The general membership was also divided into three smaller working committees to promote member interaction. These committees were Retail Interaction, Service to Industry and Financial Support/Business Assistance. Each committee identified someone to act as a "chair" person. An ATRC representative acted as the committee facilitator. The restructuring of the Coalition proved very successful as proven by the member's active participation and enthusiasm within their committees. Members were willing to work on their projects outside of the committee meetings to meet their objectives. Members now have distinct areas into which to channel their expertise. The success of this restructuring was also proven by attendance at each meeting.

5.3.1.3 Identify and Perform Services Industry Needs

The three committees within the Coalition all worked to identify the needs of the apparel industry

- Retail Interaction - Developed agendas to create communications between the retailer and other areas of the apparel pipeline.

This committee has partnered with CaliforniaMart in obtaining contact lists of retailers. CaliforniaMart has made conference rooms available to the committee for the purpose of meeting to develop and discuss informational panels between retailers and manufacturers. The committee developed a "mission statement" for use in their contacts with others in industry. The members of this committee actively worked on developing contacts with retailers to create communication and Coalition membership.

- Service to Industry - This committee brainstormed ideas into action items and completed projects. They actively worked on projects to benefit the industry and the ATRC.

This committee was responsible for the idea of "The Source", which the ATRC has developed on it's web site. "The Source" is a West Coast sourcing database for the apparel industry's sourcing needs. This committee has also completed a project of saving scrap fabric from the landfill. Their purpose was to explore the possibilities and processes involved in finding uses for industry produced scrap

fabric. "Trauma bears" have been produced from scrap fabric by State prison inmates and distributed to firemen, paramedics and the police to calm children in distress.

- Financial Support/Business Assistance - This committee worked on expanding the knowledge base of the various financial assistance programs and funding opportunities available to the industry.

A listing of tax credits and incentive programs available through the State of California was provided by a committee member and posted on the ATRC web site. A meeting was arranged between the ATRC and a training specialist from California Trade & Commerce to collect information on the possibility of getting the State Employment Training Panel (ETP) to give a training grant to the ATRC. The committee began work on a dictionary of basic terms and contact information in the financial community to help the apparel industry.

5.3.2 Increase Vendor/Customer/Donor Relationships

The ATRC staff has worked hard to maintain and continually improve relations with vendors, customers and donors. The success of these efforts is proven by the donations of equipment and supplies, repeat business for the factory and referrals for information and tours that the ATRC receives.

These efforts were accomplished in the following ways:

- The ATRC completes paperwork to the University when a gift was received. The University and the ATRC acknowledged these gifts by sending letters of appreciation.
- A newsletter with "extra" news for the Coalition members and for those who support the ATRC was mailed quarterly.
- To show appreciation to vendors, customers and donors, the ATRC created the first annual "Vendor Appreciation Lunch."

See Section 2.3 and 7.7 for more information on vendor support of the Demo activity.

5.3.3 Develop Relationships with Industry and Support Organizations

The ATRC staff attended various apparel organization and industry events, meetings, and visited apparel facilities to develop and maintain relationships with industry as listed below. The ATRC also sponsored the first annual "Industry Mixer." This was a networking event for Coalition members and those people in the

industry who have never visited the ATRC facility. The ATRC, in partnership with the Coalition, nominated three companies for the California Excellence Awards. All three companies won the nominations in different categories. Through these efforts, the ATRC not only developed new relationships and maintained old ones, but successfully recruited Coalition members and donors. Evidence of success in this endeavor was that ATRC staff attended many industry functions as invited guests.

ATRC staff participated in the following events/attended the following meetings/made visits to the following plants:

5.3.3.1 Events

- U.S. Department of Labor "L.A. Apparel Industry Stakeholders' Forum"
- U.S. Department of Labor Town Hall Meeting for Garment Contractors
- San Gabriel Valley International Business Incubator "Groundbreaking Event"
- "Straight Talk About the Economy & Retail Industry" hosted by Heller Financial
- Meetings concerning the possible Los Angeles Fashion Incubator project
- California Excellence Awards Dinner

5.3.3.2 Meetings

- Garment Contractors Association of Southern California Installation Dinner
- Apparel Round Table Consortia Meetings
- California Fashion Association meetings
- Spring Dinner of the American Chinese Garment Contractors Association of Southern California
- Association of Textile Dyers, Printers and Finishers meetings
- Women-In-Production meetings

5.3.3.3 Plant Visits

- Lorber Industries
- Koos Manufacturing

5.3.3.4 Trade Shows

Trade shows were attended as exhibitors where the ATRC handed out information about the Demo project and gave demonstrations about "The Source". Exhibit space at both of the shows below was free of charge.

- LA Textile Show

- Knit West

5.3.4 Service to the Apparel Merchandising and Management degree (AMM) and the University

The AMM degree at Cal Poly prepares students for retail and manufacturing management positions in the apparel industry. The ATRC provides an opportunity for the degree students to learn more about apparel manufacturing. In an effort to coordinate and bring together the efforts of the DoD-DLA, private industry, the AMM degree at Cal Poly and the University in general, the following major items were accomplished during Year 3 to support university activities:

- The local cable show "Inside Cal Poly" was taped for University use describing the ATRC
- Numerous tours were given to University guests/dignitaries
- Tours were given to entire classes in the AMM degree program
- Several individuals were referred to the degree program who became aware of the degree program through the ATRC
- A format and form for student/alumni job announcements was developed
- Four students were hired from various degree programs on campus to assist with ATRC activities

5.4 Develop GoldMine Database and Document Interaction

All the various contacts made with industry have been added to the Demo's GoldMine database. The database is intended to be used by all areas of the ATRC to keep information concerning contact companies as well as inform those companies regarding the Center's resources and expertise.

The database started Year 3 with approximately 5,000 companies/individuals listed. By the end of Year 3 the database had grown to approximately 8,000 records. Additionally, the existing records are constantly being updated.

6.0 Virtual Prime Vendor

In March 1997, the DLA/DSCP supply chain initiative, Virtual Prime Vendor (VPV), was developed and assigned as part of the Demo work.

The first major task of the Demo was to work with the Marine Corp Recruit Depot - San Diego (MCRD-SD) to develop a new inventory and order management system. The new system was to give San Diego and the DLA/DSCP total asset visibility of the clothing inventory status as well as migrate San Diego to new business rules in its ordering habits. Instead of few large orders over a year's time, the clothing operation would order on a "balanced flow" of smaller, more frequent orders that were more reflective of the seasonality of their business. As part of the VPV process, San Diego would work towards a substantial inventory reduction.

An existing commercial software product, Quality Logistics Management (QLM), was modified to the requirements of VPV and was installed as the new inventory and order management system. QLM was a product developed by AdvanTech, Inc. and AdvanTech served as the subcontractor to do the modification and implementation work. San Diego has successfully been using this system since June of 1998.

Additionally, an investigation of a QLM type implementation at the Army Recruit Training Center of Ft. Leonard Wood in Missouri was completed in the Fall of 1998.

Complete documentation of the MCRD- SD and Ft. Leonard Wood activity from March 1997 to the Fall of 1999 are documented in the ARN research report of VPVT1P1 which can be found on the ARN web site at <http://arn.iitri.org>.

Overall, the project realized the desired results for both San Diego and the Virtual Prime Vendor initiative.

The Cal Poly Demo also coordinated and worked closely with Product Data Integration Technologies, Inc. (PDIT) on other Virtual Prime Vendor tasks.

PDIT worked very actively in the following areas:

- 1) the development of the Apparel Asset Visibility System (AAVS) DataMart,
- 2) the Virtual Item Manager (VIM) interfaces to the DataMart,
- 3) procurement of the hardware for the DataMart,
- 4) evaluation and integration of the Balanced Inventory Flow Replenishment System (BIFRS) software to the DataMart,
- 5) Apparel Research Network- Apparel Information Management System (ARN-AIMS) evaluation, and
- 6) Defense Apparel Manufacturer Web-based (DAMWeb) tool development

These tasks were focused on the wholesale activities in the supply chain and intended to assist in the total asset visibility objective. The DAMWeb tool was intended for use with the Defense Apparel Manufacturer (DAM) and was the means by which the DSCP would have visibility into the manufacturing base. Other tasks/tools (VIM and BIFRS) were developed to provide automated decision support for the DSCP Item Managers.

More information about the Apparel Research Network Virtual Prime Vendor Initiative is available on the ARN web site at <http://arn.iitri.org>.

7.0 Establishment of a Demonstration Project - Lessons Learned

7.1 Introduction

A project of the scope and size of the Demonstration activity involved the development and management of a large staff (30 - 40), a large facility (approx. 10,000 sq. ft.), a large budget (\$4.5 million over three years), and an extensive program of work (seven major areas) within a University setting. There were many unanticipated twists and turns in the development of the Demonstration project that are documented here as "lessons learned". These "lessons" address more general, operational areas than the specific program of work areas in the previous parts of the report.

A challenge that affected every aspect of the project was communication. The Demo was programmatically and fiscally accountable to the DLA Program Manager, DSCP members of the DLA Joint Planning Committee, the University and the University's Foundation on an ongoing basis. Each entity had its own requirements and priorities, some of which were not compatible with others. Many activities and tasks were fragmented amongst multiple participants. Logistically, there was a daily challenge trying to make sure all concerned parties were aware of appropriate information and that all parties understood the total demands placed on the Demo staff. Additionally, the Demo was trying to develop activities of interest to industry and build a commercial customer base. Commercial industry functions vary differently from the four entities above.

See Appendix H for organizational charts of the ARN and Demo activities.

7.2 Staffing

Staffing presented some significant challenges. With no precedent for a similar activity on the West Coast, it was difficult to create job titles and advertise positions that were readily recognizable by potential job applicants. As a result, some hires were a good fit to the actual job and others were not, resulting in some terminations. Additionally, the performance-based nature of the contract resulted in shifts in the actual work of the contract. Staff had to be flexible as several were moved into positions with very different responsibilities than what they were originally hired to do. The key staff position responsible for supervising the demonstration factory proved to be the most difficult to fill. This position required a very unique set of skills and abilities not typical of traditional plant manager positions. This included the ability to conduct research, generate technical reports, and transfer that information to industry.

7.3 Budget Issues/Cash Match Requirement

The original statement of work was for a very large activity based on manufacturing technology and transferring that information to industry. Eighteen months (or half way) into the 3-year base contract a brand new DSCP initiative in supply chain management, Virtual Prime Vendor, also became the work of the Demo. As a start-up operation, trying to fulfill the statement of work requirements and the cash match requirements was a serious challenge. The added substantial change in direction was extremely difficult to absorb.

The cash match requirement was quite large (\$500,000 per year) for an operation with no existing facility and staff in operation. Developing income generating opportunities required industry viewing Demo offerings as valuable "fee for service" activities. The shift in programmatic direction (and subsequent budgetary impact) limited the means by which the Demo could produce income. Income was a direct result of how much product could be produced in the factory. This was a setback to the original educational mission of the Demo. In the Spring of 1995 ATRC staff applied to the State of California matching funds and received a \$250,000 award during Year 1. Subsequent funding was applied for again in the Spring of 1998 but no award was received. Capitalization of the cash match activity was an issue from the start. The University did not have sufficient resources to provide a pool of funds for start-up of the cash match activity. A revolving loan at Foundation was the means by which sufficient funds were made available to support this activity.

7.4 Business Plan

The University decided during the first year of the contract to require ATRC staff to complete a business plan. This was very difficult to do because of the performance-based nature of the contract and the knowledge that the DLA Program Management office could redirect the activities of the Demo project at any time.

Since no ATRC staff had any previous experience in this area, outside assistance was needed to do the business plan. The business plan activity took five months to complete. Within one month of its completion it was no longer valid.

The University used the business plan to make internal decisions regarding space requirements of the project. Once those decisions were completed there was no need for an update to the business plan.

This proved to be a lesson in how best to deal with unexpected requirements that were very difficult to meet. The Demo did it's best to satisfy the requirement as quickly as possible in order to be able to move on with other project work.

7.5 Satisfying Space Needs

Space requirements for an activity as large as the Demonstration project proved to be another challenge with significant impact to the start-up of the Demo. The University had difficulty identifying a suitable area in which to place the activity and so did not finalize specific plans until 11 months into the first year of the contract. Eighteen months were required to remodel, renovate and add the total amount of needed space. As a result, work (and cash match generation) that should have been spread out over three years had to be completed in 18 months.

7.6 Institutional Infrastructure Support

The Cal Poly Pomona Foundation, Inc handles all grants and contracts, awarded to Cal Poly University Pomona. Foundation systems handled personnel, payroll, accounting, etc. functions. Since these functions were not in-house to the Demo activity, continuing issues of Foundation systems and methods not being compatible with certain "business" activities of the Demonstration persisted throughout the base contract. Foundation systems were set-up to service grants and the Demo was not operated as a grant. The Demo had to develop its own internal systems to compensate for what the Foundation was unable to provide.

The DLA Demonstration project was the single largest award the University had received as of 9/95. The potential impact to a teaching university is very difficult to envision until the award actually occurs and the specifics of the project develop into reality.

7.7 Support from the Technology Vendors

Support from the technology vendors, in general, was excellent. Vendors consistently provided the needed equipment for the factory floor when asked. The Demo wanted to increase the involvement of the vendors with the Demo by providing services to the vendors. These services included display and distribution of vendor literature and hosting vendor guests and activities. Few were interested. Demo staff were disappointed that enhanced two-way relationships did not develop.

7.8 Response from Industry

The bulk of the California apparel manufacturing businesses are companies of less than 50 people that use little of the available advanced technology and manufacturing processes that benefit larger companies.

The ATRC and many other interested parties have attempted to identify services that would assist California companies in upgrading the potential of these businesses. Many factors have limited the success of previous attempts. Ethnic/language issues, company size, lack of exposure to technical information, the low volume nature of the fashion business, the high proportion of single service contracting shops, and the difficulty in attracting new sewing operators to the industry have all affected the results of previous efforts.

While many in industry came to see what the Demo was doing in its model factory, few were able to envision how to afford to do the same with modular manufacturing and advanced technology. Educational efforts were only moderately successful due to a basic lack of understanding by industry of where opportunities for improvement through education were applicable to their business. More time and effort needs to be spent in this area

On the positive side, there have been many well-known and successful companies who view the activities of the Demo critical to the future success of industry. These companies have supported and been active participants in Demo activities through donations and/or serving as members of the Coalition.

7.9 Reporting Requirements

As in all government funded R & D contracts, reporting is a substantial component of the Demo contract requirements. Because of the size and scope of the DLA Demo, ATRC staff needed to devote extensive hours to the reporting requirement. In an environment where factory production is an important component of the project activity, it is sometimes difficult for the staff to see the reporting requirements as other than an obstacle in achieving production goals. A real challenge for the Demo management was to convince the staff that documenting the Demo process at all levels was in the long run more important than reaching short-term production objectives.

8.0 Summary and Future Plans

During the first three years of operation the ATRC gained experience and collected information in all of the contractually required areas of the DLA Demonstration. This is documented here and in the other final technical reports produced by the Demo. Based on this experience the Cal Poly Apparel Manufacturing Demonstration will refocus its attention and restructure activities for years four and five of the demonstration as follows:

1. The VPV, manufacturing, Coalition and contacts with industry/marketing activities will continue. These are the core and essence of the demonstration activity. These activities will adjust over time as program requirements develop and change.
2. Additional work will be added to expand the amount of manufacturing documentation and the level of interaction with industry. More educational activities for industry are planned in the way of seminars and workshops. These will focus on sharing the knowledge the Demo staff has acquired about apparel manufacturing.
3. The military contractor recruitment activity will be discontinued during Year 4. The DSCP was satisfied in the level of interest shown by California contractors in military contract work.

APPENDICES

Appendix A

Glossary

AAVS	Apparel Asset Visibility System
AMM	Apparel Merchandising & Management
AQL	Acceptable Quality Level
ARN	Apparel Research Network
ARN-AIMS	Apparel Research Network-Apparel Information Management System
ATRC	Apparel Technology & Research Center
BDU	Battle Dress Uniform
BIFRS	Balanced Inventory Flow Replenishment System
CAGE Code	Commercial & Government Entity Code
Coalition	ATRC Advisory Board
CP Demo	Cal Poly Demo
DAMWeb	Defense Apparel Manufacturer-Web
DLA	Defense Logistics Agency
DLIS	Defense Logistics Information Service
DoD	Department of Defense
DSCP	Defense Supply Center Philadelphia
EDI	Electronic Data Interchange
ETP	Employment Training Panel
Forming	First stage of modular manufacturing
JIT	Just in Time
Kan ban module	Modular work flow with a small amount of work-in-process between each operation as a buffer
MCRD-SD	Marine Corp Recruit Depot-San Diego
Norming	Third stage of modular manufacturing
PBS	Progressive Bundle System
Performing	Fourth stage of modular manufacturing
QLM	Quality Logistics Management
Storming	Second stage of modular manufacturing
Tariff	Range of sizes available for a specific military item
TeleSpecs	Automated system to obtain Military/Federal specifications and Commercial Item Descriptions
"The Source"	ATRC Industry Sourcing Database
TSS module	Toyota Sewing System module where the work is walked through the entire process with no work-in-process between operations
VIM	Virtual Item Manager
VPV	Virtual Prime Vendor
WIP	Work in Progress

Appendix B

List of Products Made at the ATRC Demo

<u>Commercial Customers</u>	Product	Quantity	Cost(Direct)
Apparel Technologies	Sewing, Cutting & Fusing Skirts	4,510	\$11,366.58
Bali Emerald	Patternwork, Tracing & Specs Dress, Skirt & Kids Patterns	1,904	1,980.98
Basic Line	Cut, Sew, Marker, Zippers, Elastics, Grommets, Cord Locks	949	5,639.72
Calderon Sportswear	Marker Copy Jacket	1	27.06
Caliber Sports	Jackets	350	7,318.56
Character Costume	Evaluation & Repairs on machines	6	234.92
Dahle's	Sew, Cut, Patterns/markers. Pique Polos, Sand Jersey, Beach Pants, Swim Trunks, Camp Shirts	5,238	45,964.61
Dakota Skye	Cut Shirts, Shorts	11,000	50,796.80
Disneyland	Marker, Star Tour Jackets, Raft Shorts, & Labels	1,941	18,007.48
Gotcha International	Cutting, Fusing, Sewing Belt Loops Shorts	17,722	40,823.28
Grand Prix	Cutting Sewing Markers Fusing, Screenprint Yamaha Jackets, Shirts	9,917	54,646.84
Hippie Skivvies	Digitizing & Grading Thong	14	633.26

Isenberg	Swatches	2	79.00
Lady T-Golf	Patterns & grading	1	208.38
J.P. Sportswear	Mini Markers	5	2,321.98
Just Surf/Blue Hawaii	Hawaiian shirts	150	1,065.00
MCG Textiles	Eye Glass Cases	10,628	9,094.54
ML Kishigo	Pattern work & Digitizing Jackets	6	1,336.89
PDIT	Golf Shirts	129	1,961.54
Pipe Dreams	Sew Long Jumpsuits	3,070	18,244.00
QuikSilver	Sew & Finish Fleece Pants, Shirts	68,221	192,825.85
R & K	Shirts	50	422.40
Ritz	Sew Polos	662	2,345.58
RSL Construction	Screen print Polos & T-Shirts	697	7,609.54
Susan Dunn	Cut Samples	38	2,104.27
Ultimate	Consulting	1	150.00
Western University	Lab Coats	411	3,861.00
		Total	\$481,070.06

<u>University Customers</u>	Product	Quantity	Cost(Direct)
Alumni Affairs	Screenprint shirts	60	\$1,039.20
Arabian Horse Library	Re-Upholstery chairs	9	1,082.50
ASI	Emb, Screening Caps & Sashes	35	795.64
Athletic	Emb Polo Shirts	12	90.28
Bronco Bookstore	Labcoats	350	3,165.08
Bronco Copy & Mail	Emb Polo Shirts	20	465.48
College of Agriculture	Drape of College	1	54.13
Credit Union	Screenprint T-Shirts	7	232.19
Development	Drape	1	54.13
Dorm – Montecito Hall	Screenprint T-Shirts	50	343.10
Dorm – Palmitas	Screenprint T-Shirts	61	435.17
Facilities	Polo Shirts	439	7,884.57
Foundation	T-Shirts	356	2,372.77
Fullerton-Titans	Screenprint T-Shirts	132	907.57
Graphics	Polo Shirts	20	876.83
ITAC	Screenprint Polo Shirts	166	2,596.59
Los Olivos	Emb & Logo Polo shirts	23	211.60
Public Safety	Sew patches on Polos	12	97.43
Student Health	Emb golf Shirts	38	1,015.92
Student Orientation	Emb Caps	285	2,516.81
Summer Day Camp	Screenprint T-Shirts & Polos	80	541.25

UC Davis	Firefighter Uniforms	40	2,368.51
University Village	Emb Polo Shirts	20	468.72
Urban Planning	Screenprint T- Shirts	31	362.64
		Total	\$29,978.11

Appendix C

Equipment List

Equipment	Manufacturer	Model	Serial #
Cover Stitch	Brother	FD4-B272	M8527014
Cover Stitch	Brother	FD4-B272	L1578643
Under Trim Double Needle	Brother	LT2B885-905	L5521707
Under Trim Bartack	Brother	LK3-B450E-2	A6538988
Sew Over Lock	Brother	MA4V61-95-5	D6558600
Sew Over Lock	Brother	MA4V61-95-5	D6558604
Sew Over Lock	Brother	MA4V61-95-5	D6558599
Sew Over Lock	Brother	MA4V61-95-5	D6559251
Under Trim Single Needle	Durkopp	271-1400-42	334202
Over Lock	Juki Union	39500W	
Button Hole	Juki Union	LBH-795N	LBHWL40785
Button Hole	Juki Union	LBH-783	LBHXL51262
Bartack	Juki Union	LK-1852	LKOJE61583
Button Sew/Auto Feed	Juki Union	MB-373N	MBOYC330492
Cover Stitch	Juki Union	34800F16	1749004
Cover Stitch	Juki Union	CS122401 3B6OUT4	1783734
Button Hole	Juki Union	LBH-773	277101170
Bum & Stitch	Juki Union	37600-26	1722355
Under Trim Single Needle	Juki Union	DDL-550N7	DDLWG44430
Regular Single Needle	Juki Union	DDL-5550N	DDLYE41109
Single Needle	Juki Union	DLN-5410N-7	DLNN519140
Single Needle	Juki Union	DDL-5550N-3	DDLYC16858
Single Needle	Juki Union	DDL-5550N-7	DDLWG44258

Equipment	Manufacturer	Model	Serial #
Single Needle	Juki Union	DDL-5550N75	DDLNW25613
Single Needle	Juki Union	DDL-5550N-3	DDLYC16880
Single Needle	Juki Union	DDL-5550N-7	DDLXA43655
Single Needle	Juki Union	DDL-5550N-7	DDLWJ20821
Under Trim Single Needle	Juki Union	DDL-5550N-7	DDLWG442296
Regular Single Needle	Juki Union	DLN-5410N	DLNYC28120
Regular Double Needle	Juki Union	LH-3128	LHOXD03949
Regular Double Needle	Juki Union	LH-3168	LHOXA08317
Regular Double Needle	Juki Union	LH-3178	LHOXJ08241
Cutter	Lectra	Victor 2500	600656
12 Head Embroidery	Melco	EMC 10/12	1001

Over Lock	Pegasus	EX520402	9121435
Sew Over Lock	Pegasus	EX324403	9121861
Under Trim Single Needle	Pfaff	563	1485880
Sew Over-Lock	Singer	842U	J5595583
Zig Zag	Singer	143W3	W1434641
Under Trim Single Needle	Singer	59/D300G	852810752
Sew Over-Lock	Singer	381	A2514201
Steam Boiler	Veit		80003914
Pocket Setter	Durkopp Adler		
Lectra Cutter	Lectra Systems		
Lectra CAD System	Lectra Systems		

Appendix D

How to Become a Military Contractor

Apparel Technology & Research Center How to Become a Military Contractor

Step I

Please read the following documents

- **How to Become a Military Contractor**
Introduction to the Defense Personnel Support Center
- **Introduction to the Directorate of Clothing & Textiles**
Gives fundamental information on military contracting
- **Memorandum to Prospective Supplier**
Gives information for the completion of applications 2051 and 129

Step II

Please complete the following applications and mail to:

*Melanie McLean, Project Manager
Apparel Technology & Research Center
California State Polytechnic University, Pomona
Pomona, CA 91768*

- **Request for Assignment of a Commercial and Government Entity (CAGE) Code (Form 2051)**
- **Solicitation Mailing List Application (Form 129)**
This list gives the various contracts up for bid
- **Generic Items Purchased by the Directorate of Clothing and Textiles**
Lists those items purchased by the Defense Personnel Support Center and their item numbers

Please note that you will not receive any correspondence from the DPSC. Once your applications have been processed, the ATRC will contact you with your CAGE code number

Step III

The following documents will direct you on how to contact the DPSC and request specs on those items you are interested in producing for the military. Samples must be forwarded to the DPSC for approval.

- **Memorandum to Prospective Clothing, Textile, Equipment and Footwear Contractors with attachment "Anticipated Requirements"**
Forecast of items quarterly required
- **Directorate of Clothing and Textiles, "Welcome to the Clothing and Textiles Home Page"**
Automated System for Cataloging and Ordering Textiles (ASCOT)
- **Memorandum for Clothing & Textiles Contractors "Clothing, Textiles and Personal Equipment Specification Ordering Information"**
Lists three ways to obtain Military/Federal specifications and Commercial Item Descriptions from the Department of Defense Single Stock Point (DODSSP)
- **How to Obtain Specifications and Standards from the Department of Defense Single Stock Point**
Gives information on how to obtain Military/Federal specifications and Commercial Item Descriptions for the DODSS including phone numbers and addresses

Step IV

The following documents give information on bidding and how to prepare for a team survey

- **Checklist to Prevent Costly and Time Consuming Mistakes Before Enclosing Your Bid in the Envelope**
Checklist for referral before mailing official bid
- **Centralized Blanket Purchase Agreements**
This technique is explained which will replace the existing manual purchasing system
- **Checklist "Preparing for the Survey"**
Factors to consider in preparation for a pre-award survey

Appendix E

Military Contractor Recruitment Results

Company	City	Information Packet Mailed	Application Mailed	Cage Code
Frank Walter Sportswear	Los Angeles	01/09/96		
PCK Fashions	Los Angeles	06/20/96		
Linda Apparel	San Francisco	07/25/96		
Alvin Blades	Alta Dena	08/06/96		
S&R Products	Santa Ana	10/10/96		
Scunchely	North Hollywood	10/15/96		
Essential Fashion Group	El Monte	12/13/96	Direct w/DPSC	
JP Sportswear	Los Angeles	12/16/96		
Lee's Clothing	Baldwin Park	12/19/96		
Shan Shan Seto	Los Angeles	12/20/96	05/10/97	099R0
Kaylin Fashions	Los Angeles	01/08/97	05/05/97	099R3
GS Dunbar	Montebello	01/10/97	Direct w/DPSC	
Productions Unlimited	Los Angeles	01/14/97		
Throttle Threads	Westminster	01/14/97		
Estella Tops	Huntington Park	03/13/97		
ABC Emblem	Fremont	03/17/97		
NS Apparel	Los Angeles	04/29/97		
Outer Image	Santa Ana	04/30/97		
YL International, Inc	Cypress	04/30/97		
BAMM	Vista	04/30/97 sem		
Basic Line Corp	Vernon	04/30/97 sem		
Carabella Collection	Irvine	04/30/97 sem		
Colgan Custom	Fountain Valley	04/30/97 sem		
Concepts in Fashion	Los Angeles	04/30/97 sem		
Elizabeth Sportswear	Rosemead	04/30/97 sem		
EVCO	San Diego	04/30/97 sem		
Expo Sportswear	Los Angeles	04/30/97 sem		
Gateway Advertising	So El Monte	04/30/97 sem		
HGR Enterprises	Los Angeles	04/30/97 sem		
Jassemi, Inc	Los Angeles	04/30/97 sem		
JMY Company, Inc	No Hollywood	04/30/97 sem		
KYF, Inc	Baldwin Park	04/30/97 sem		
LA Gentex Corp	Los Angeles	04/30/97 sem		
Terry Town	Placentia	04/30/97 sem		

Action Plus	Industry	04/30/97 sem		
Prizzi	So El Monte	05/01/97		
Audio Future Wear	Malibu	05/02/97		
Half Moon Bay	Santa Cruz	05/02/97		
Krystal K International	Industry	05/02/97		
LA Dye & Printworks	Vernon	05/02/97		
ML Kishigo	Santa Ana	05/02/97		
Timeless Apparel	Riverside	05/02/97		
Holly Designs	Santa Fe Springs	05/13/97		
Pacico	Industry	05/13/97		
NS Apparel	Los Angeles	05/14/97		
National Concept, Inc	Los Angeles	05/21/97		
LCA Intimates	Vernon	06/17/97		
West Tee Graphics	San Jose	08/21/97	07/07/98	1G4Y8
Sunwear	San Diego	10/13/97	Direct w/DPSC	
New Jeremy	El Monte	11/01/97	11/10/97	1C3V6
NK&T Corporation	Fountain Valley	11/26/97		
Quality Fashions	Santa Ana	11/26/97		
Sewing Company	Oceanside	12/01/97	12/10/97	1C1E4
Corine's Sewing Contractors	Huntington Park	12/04/97		
Automotive Soft Goods	San Diego	12/10/97		
Quickline Manufacturing	Long Beach	12/10/97		
Blue Marlin	San Francisco	12/15/97		
CY Fashion	Mission Viejo	12/15/97		
Pure Jamaican	Beverly Hills	12/17/97	01/28/98	1C1D7
Hoops N Loops	Chino Hills	02/26/98		
C CWK Enterprises	Huntington Beach	04/29/98	07/08/98	1G4Y9
American Style	Los Angeles	05/12/98	07/07/98	1GLR1
Biscotti	Oakland	05/12/98		
Pagano West	Chula Vista	05/12/98		
City Girl	Commerce	05/20/98		
K-Tee Company	Los Angeles	05/20/98		
Michelle of California	Los Angeles	05/20/98		
PFD Garments	Los Angeles	05/20/98		
Absolute Apparel	Los Angeles	05/27/98		
Edgar Nunez	Whittier	05/27/98		
Eratex Enterprise	Los Angeles	05/27/98		

JC Cutting & Fusing	Los Angeles	05/28/98		
Trophy	Los Angeles	05/28/98		
Automatic Cutting	Los Angeles	06/18/98	08/25/98	1HXZ6
Fashion Knitwear	Indio	06/18/98	08/25/98	1HYA1
Oilcloth International	Los Angeles	06/18/98		
Rag Collection	Gardena	06/19/98		
A Softgoods Mfg	San Diego	07/21/98 sem		
A&A Sportswear	Maywood	07/21/98 sem		
A&L Garment Cutting	Los Angeles	07/21/98 sem		
Action Gear	Vernon	07/21/98 sem		
All Apparel Products	So El Monte	07/21/98 sem		
Apparel Stitch	So El Monte	07/21/98 sem		
California Knitting Mill	Los Angeles	07/21/98 sem		
Corin's	Huntington Beach	07/21/98 sem		
C-Perspectives	So El Monte	07/21/98 sem		
Elastic West Ind	Vernon	07/21/98 sem		
FA-FESK	Los Angeles	07/21/98 sem		
Friendly Company	Los Angeles	07/21/98 sem		
George Cutting Service	Vernon	07/21/98 sem		
J&J Merchandising Trading	Los Angeles	07/21/98 sem		
J&R Fashions	Garden Grove	07/21/98 sem		
Johnson Safety	San Bernardino	07/21/98 sem		
K&C Apparel, Inc	Los Angeles	07/21/98 sem		
LA Sam, Inc	Vernon	07/21/98 sem		
Maggie's Boys	Irwindale	07/21/98 sem		
Milano Fashion	Los Angeles	07/21/98 sem		
Neroli	Los Angeles	07/21/98 sem		
Pakalolo	Los Angeles	07/21/98 sem		
PCA, Inc	Rancho Dominguez	07/21/98 sem		
Pineapple Clothing	Oceanside	07/21/98 sem	Direct w/DSCP	
QTS	Compton	07/21/98 sem		
QTS Dyeing & Washing	Compton	07/21/98 sem		
Sand Pebbles	Riverside	07/21/98 sem		
Switch USA	Vernon	07/21/98 sem		
Unity Clothing	El Monte	07/21/98 sem		
Yenston Enterprise	So El Monte	07/21/98 sem		
Calmax Silk	So El Monte	08/10/98		
CMI Manufacturing	Berkley	08/10/98		

Fancy Embroidery	Los Angeles	08/10/98		
Funny Collections	Los Angeles	08/10/98		
J&J Merchandising	Los Angeles	08/10/98	08/25/98	03PH2
Jessica's Sportswear	Oakland	08/10/98		
Mark Cutting & Fusing	Los Angeles	08/10/98		
Pacific Color & Design	Los Angeles	08/10/98		
Ram Apparel	Santa Ana	08/10/98		
Sand K	City of Industry	08/10/98		
T&T Fashion	Santa Ana	08/10/98		
Vertical Ideas	Northridge	08/10/98	08/25/98	1HXU2
Beach Bloomers	Santa Ana	08/13/98		
Certified Business Consulting	Tujunga	08/13/98		
Chavez Cutting	City of Industry	08/13/98		
Let's Patch it Up	Sun Valley	08/13/98		
RB Sewing Contractor	El Monte	08/19/98		
Executive Clothing Service	Walnut	08/25/98		
Super Sew	Los Angeles	08/25/98	09/28/98	1KNR5
Jung's Fashion	Northridge	09/18/98	10/28/98	1KAP7
Y.L. Int'l, Inc.	Cerritos	09/23/98	10/28/98	1JOD4
KC's Fashions	Paramount	10/06/98		
Blankenship Police Supply	Mentone	10/06/98		
Kannan Fashion	Los Angeles	10/06/98		
Richkim Corp.	Los Angeles	10/06/98		
Jose Vaquera Company	Los Angeles	10/06/98		
Cho Won Inc.	Van Nuys	10/06/98		
Lucky Garment Shop	Sacramento	10/07/98		
Westpoint Marketing Int'l	Los Angeles	10/07/98		
Tai Fu Garment Co.	South El Monte	10/08/98	12/04/98	1K7H0
Penny Fashion	South El Monte	10/13/98	12/04/98	1K5V8
Pep Threads/Style Leader	Orange	10/14/98		
Ju Ju Company	Los Angeles	10/16/98		
Borraez Studio	Los Angeles	10/20/98		
Way Out West, Inc.	Culver City	10/30/98		
Sal Cutting Service	Los Angeles	10/30/98		
Michel Design USA	Los Angeles	10/30/98		
Joel Fashion	Los Angeles	10/30/98		
Russ Berens	Chatsworth	10/30/98		
Ace Cutting	Los Angeles	10/30/98		

Azitex	Los Angeles	10/30/98	12/04/98	1J2U7
San Joaquin Textiles	San Joaquin	10/30/98		
Funny Collections	Los Angeles	10/30/98		
Cho Wong	Van Nuys	10/30/98		
Chicago Laundry & Dye	Santa Ana	10/30/98		
Ready Clothes	Alhambra	10/30/98		
Bernard Melamed & Co	Los Angeles	10/30/98		
Mode Sara	Los Angeles	10/30/98		
Ematex, Inc	Vernon	10/30/98		
California Basics	Los Angeles	10/30/98		
Armtex, Inc	Pilot Mountain, NC	10/30/98		
Marker Express	San Francisco	11/03/98		
Esperanza Design Studio	Hollywood	11/03/98		
Great Fabrications	Los Angeles	11/11/98		
Jade Production	Los Angeles	11/19/98	01/12/99	1J2U3
Blue Planet Intl Inc	Los Angeles	11/19/98		
Ann Chu	San Gabriel	not a business		
Debbie Knitting	Los Angeles	11/20/98	01/12/99	1J2U5

Appendix F

List of Published Articles about the ATRC

Articles:

1. "Made at the Apparel Technology & Research Center"	Foundation News	12-97
2. "Covering the Market"	Los Angeles Times	2-98
3. "Contractors Look to New Technologies as Wages Rise"	California Apparel News	3-9
4. "Getting Your Product to Supermarket"	Los Angeles Times	4-98
5. "Tech Treasure Hunt"	Los Angeles Times	4-98
6. "Tailored for Efficiency"	Los Angeles Times	4-98
7. "Apparel Technology & Research Center"	Foundation News	5-98
8. "Cal Poly Helps Military, Industry Prep for Global Competition"	California Apparel News	5-98
9. "Not Sew Simple"	The Press-Enterprise	7-98
10. "Banking on a New Strategy"	Los Angeles Times	8-98
11. "Fashioning a Defense to Imports, Recession" – Business Makeover	Los Angeles Times	10-98
12. "OPD Coordinates Holiday Food Drive for Local Residents"	Oceanside Magazine	Wntr 98
13. "Police Coordinate Holiday Food Drive"	Oceanside Police Dept.	11-98

Appendix G
Coalition Members

Coalition Members 1998

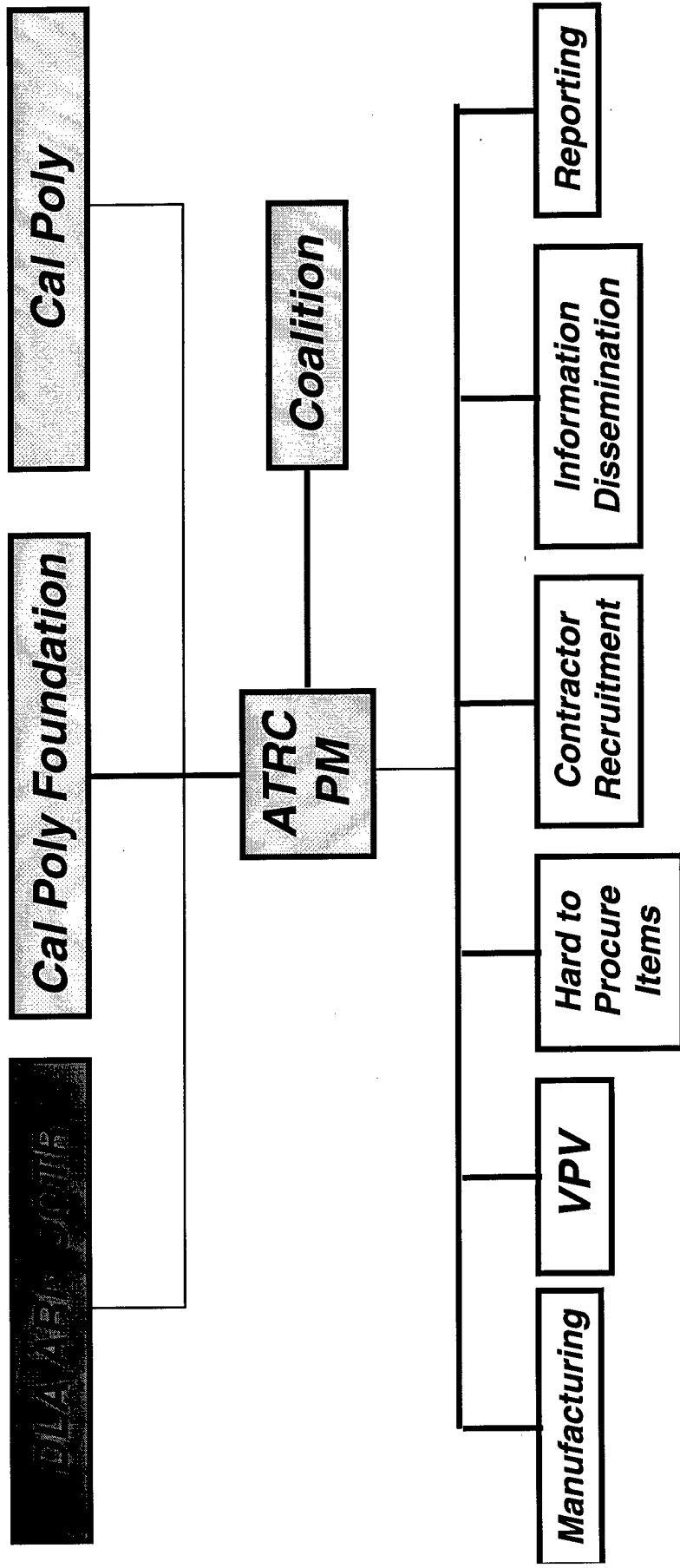
<i>First</i>	<i>Last</i>	<i>Company</i>	<i>Company Type</i>
Ernest	Aguilar	Lancaster Uniform Cap Co.	Manufacturer
Robert	Atkinson	Coats American	T/N&F Supp
B. James	Bottoms	Chorus Line Corporation	Manufacturer
Burt	Brooks	Brooks Industries	T/N&F Supp
Sergio	Calvo	Grand Prix Apparel & Accessor.	Manufacturer
Jacob	Chamanian	IAN Manufacturing	Manufacturer
J. C.	Choe	Textile News	Service Org
Peggy	Chu	New Jeremy Inc.	Contractor
Barry	Cohn	Cohn Handler & Co.	Service Org
Walter	Colgan	Freudenberg West	T/N&F Supp
Sean	Coppage	YKK USA, Inc.	T/N&F Supp
Steve	Craver	Groz-Beckert USA, Inc.	T/N&F Supp
Joe	Dennison	Prudential Overall Supply	Manufacturer
Gordon	Duffy	Singer	Equip Supp
Esther	Dunbar	G.S. Dunbar & Co.	Contractor
Nancy	Edwards	Disneyland Costuming/Walt Disney Entert.	Contractor
Joel	Esmond	Sew-Forth, Inc.	Manufacturer
Scott	Espeseth	Continental Business Credit	Service Org
Fred	Freehling	Darbo Manufacturing Company	Manufacturer
Richard	Gold	Juki Union Special, Inc.	Equip Supp
Rodney	Harrelson	Lectra	Equip Supp
Tom	Higgins	Heller Financial	Service Org
J.P.	Jardin	Computer Consulting & Software	Softwre Supp
Susan	Jeffrey	The Sewing Company/B.C. Breakfield Enterprises, Inc.	Contractor
Gary K.	Jue	Amer Chin Gar Contr Asso of So Calif	Service Org
Mark	Klein	Lunada Bay	Manufacturer
Calvin	Lee	Kimberly Enterprises	Contractor
Casey	Lee	The Genesis Company	T/N&F Supp
Matthew	Lenoci	Matteo Fine Bed Linens	Manufacturer
Tommy	Leung	Heller Financial	Bus Assist
Mitchel	Maeng	Apparel Roundtable & Assoc.	Service Org
Steven	Mandel	Smith Mandel & Associates, LLP	Bus Assist
Danny	Marrujo	Baby Bias Co.	T/N&F Supp

Mark	McElrath	Da-Rue of California	Manufacturer
Cardie	Molina	Oilcloth International	Manufacturer
Stephen	Nitzberg	Lorber Industries of California	Textile Supp
Don	Owen	California Joy, Inc.	Contractor
Dean	Planeaux	Heller Financial	Bus Assist
Sal	Prizzi	Prizzi Sewing Machine Company	Equip Supp
Silvio	Quintas	Best Washington Uniform & Linen&Supply	Manufacturer
Robert	Reed	Stitches, Inc.	Contractor
Art	Resendez	Dai-Ichi Kangyo Bank	Bus Assist
Joe	Rodriguez	Garment Contractors Assoc.	Service Org
Jeff	Rudin	Quail Leasing	Bus Assist
Christine	Samuelian	Southern California Edison	Bus Assist
Ricardo	Slutzki	Colman Saks, Inc.	Softwre Supp
Michael	Spann, Jr.	M.S. Sales Company, Inc.	Textile Supp
Steve	Sternberger	Autometrix	Equip Supp
Ian	Stonehouse	Mark Cutting & Fusing	Contractor
Ron	Tanzman	Aptan Corporation	T/N&F Supp
Jack	Tasso	TSR Yarns, Inc.	Textile Supp
Jeff	Waldman	Security Textile Corporation	T/N&F Supp
Jennifer	Weindorf	Grand Prix Apparel & Accessor.	Manufacturer
Robert	Whitehead	AMZ Packaging	T/N&F Supp
Martin	Wicksman	Martin Wicksman Pattern Service	Contractor
Janette	Williams	Quality Assurance Consulting	Bus Assist
Willie	Wilson	Mar-Am Insurance	Bus Assist

Appendix H

Structure Chart

ATRC



DLA Executive Group

