The AMTEX Partnership

Fourth Quarter Report

September 1994

Issued by
The AMTEX Program Office

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EXECUTIVE SUMMARY

The AMTEX Partnership™ is a collaborative research and development program among the U.S. Integrated Textile Industry, the Department of Energy (DOE), the DOE laboratories, other federal agencies and laboratories, and universities. The goal of AMTEX is to strengthen the competitiveness of this vital industry, thereby preserving and creating U.S. jobs.

Operations and Program Management

The operational and program management of the AMTEX Partnership is provided by the Program Office. This report is produced by the Program Office on a quarterly basis and provides information on the progress, operations, and project management of the partnership.

Program Office Operations and Management

The Operating Committee met in July at the Sandia National Laboratories (SNL). The budget recommendations from the Industry Technical Advisory Committee (ITAC) were discussed and approved. This action included the initiation of a Cotton Biotechnology project focused on improving the quality of cotton fibers. Funds to be approved later were set aside to initiate a project called On-line Process Control for Flexible Fiber Manufacturing, or OPCon.

Project Initiation

All but one of the 35 CRADAs required to initiate the first six projects received approval by the end of the quarter. The project plans and CRADAs for the Cotton Biotechnology project are under development. The R&D needs of the OPCon project are under the leadership of the Textile Research Institute (TRI).

Bobbin Show

The technical accomplishments from the first months of AMTEX operation were highlighted at a Bobbin Show display in September. Hundreds of visitors, including representatives of the trade and national press, visited the AMTEX display.

Projects

Computer-Aided Fabric Evaluation

During this performance period, the Computer-Aided Fabric Evaluation (CAFE) Project made significant progress in the areas of On-Line Greige (OLG), Color Printed Pattern Goods (CPPG), and Critical Path Elements (CPE). In each of these areas, the teams are ahead of or on schedule, as defined by the CAFE Project Plan. In just the past three months, the CAFE team has participated in the Bobbin Show, held a CAFE Industry/Laboratory Quarterly Review, attended the initial Beta Test Site Selection Committee meeting, worked with the industry partners to formalize the Vendors Consortium, and prepared for a President/CEO Day to be held at Oak Ridge National Laboratory (ORNL).

Other accomplishments of the three teams (OLG, CPPG, and CPE) on the CAFE Project include:

- completion of the CPE Functional Description and Requirements Document, with the system requirements documents well underway for the CPPG and CPE
- significant progress in greige defect detection, especially in analysis of the cost and benefits of sensor suite coverage
- design of an inspection system for color printed pattern goods that includes a pattern recognition and colorimetric imaging prototype.

In addition, plans for the next two quarters include development of a CAFE economic model, continuation of the loom diagnostic studies, and completion of the second generation printed fabrics inspection system.

Textile Resource Conservation

The first major industry review of Textile Resource Conservation (TReC) task efforts was presented August 23 and 24, 1994, at Argonne National Laboratory (ANL). Based on comments received after the review meeting and during visits by groups of industry representatives to several of the laboratories, TReC task progress has been rated as satisfactory by the Textile Industry Partners. Some minor delays in milestones and some variances in the project plan were encountered during this quarter. These delays were related to late sample deliveries to some investigators and minor directional changes in task efforts, based on suggestions from the industry partners. These directional changes are expected to ensure TReC task efforts better meet the needs of the textile industry. Excellent results have been achieved in the development of processes for recovery of colorants and

auxiliaries, solid fibrous wastes, and the high efficiency application of chemicals to fabrics. Work in the coming quarter will concentrate on refining process concepts and developing the FY95 Project Plan.

Demand Activated Manufacturing Architecture

The major external milestone of the fourth quarter was the successful demonstration of DAMA Electronic Marketplace Concepts at the 1994 Bobbin Show. Approximately 30,000 people attended this show, which was focused at the most threatened sector of the Integrated Textile Complex -- the apparel manufacturer. Several hundred people viewed demonstrations in the booth and many left information for follow-up. DAMA received very positive coverage in the trade press, and expects high-visibility coverage in the New York Times sometime in November.

In meeting this milestone, DAMA task teams developed an Electronic Marketing and Advertising concept using the Internet and World Wide Web. Also, DAMA demonstrated electronic purchasing capability that exists today in narrow applications, but could effectively be adapted for broad use and easy access, especially for smaller companies. Finally, DAMA demonstrated an alpha version of a *management flight simulator* that modeled pipeline-wide inventory effects of decisions made in specific places within the apparel pipeline. The lesson learned was that by working as a team in a *vertical* pipeline, companies can make decisions that optimize their gain by optimizing the whole system. DAMA showed that it can reduce the risk of a *prisoner's dilemma* scenario by sharing information throughout the system.

Other progress included development of a textile *electronic yellow pages* as part of the information available in a DAMA. Also notable is the communications infrastructure task was successful in engaging more than 90% of the industry individuals participating in forming electronic mail connectivity, and also in publishing a DAMA directory.

Embedded Electronic Fingerprinting

The Embedded Electronic Fingerprinting (EEF) project is developing miniature electronic devices as permanent identification markers and information storage for textiles and apparel. EEF is a dual laboratory effort, but although Pacific Northwest Laboratory[1] (PNL) received funding in May, Lawrence Livermore National Laboratory (LLNL) has not yet been funded. Initial efforts have been devoted to identifying

[1] Pacific Northwest Laboratory is operated for the U.S. Department of Energy by Battelle Memorial Institute under Contract DE-AC06-76RLO 1830.

the state-of-the-art technologies in the rapidly changing radio frequency identification device (RFID) area. The project intends to hold an exposition of the most advanced capabilities at Textile/Clothing Technology Corporation [TC]^2. At that point, the leading candidate technologies will be matched to the industrial needs list now being compiled. If an exact technological match is not found, the project must drive the research and development effort necessary to produce a useful product.

Rapid Cutting

The Rapid Cutting project is teamed by 6 of the national laboratories, 10 apparel manufacturers, and 3 cutting equipment manufacturers. The laboratories have technologies appropriate for the single layer, single garment cutting of textiles to attain a quick response manufacturing capability at breakthrough cost/performance levels. Achievement of this goal will depend upon cutting improvements in blades and blade drivers, and on photonics using next generation research lasers. As of this reporting period, five of the six laboratory teams have begun work on proof-of-principle demonstration and quick result technology transfer tasks. ANL and Lawrence Berkeley Laboratory (LBL) have applied material and coating technologies that may substantially improve cutting edge life for current multilayer hand-held and automatic garment cutting systems. ANL has also embarked on system improvements for CO_2 and YAG:Nd lasers. LBL has commenced work on magnetic drivers for advancements in knife-based reciprocating cutting heads. Los Alamos National Laboratory (LANL) has begun to characterize optimum bond breaking requirements, using two laser wavelengths. For Phase One, the effective start date was August 1, 1994; a Phase One project review is planned for January 1995. As of September 30, 1994, 21% of budget has been spent and, with minor exceptions, the project is on schedule.

Sensors for Agile Manufacturing

The objective of the Sensors for Agile Manufacturing (SFAM) project is to develop sensors and feedback control methods that will improve the textile industry's quality and productivity in the cutting and sewing processes associated with garment assembly. The first project tasks concentrate on the development of sensors for fabric edge detection and felled seam sensing.

The tasks at all three of the participating national laboratories (ANL, PNL, and SNL) are progressing at a rapid pace. During this quarter, Kevin Widener, Laboratory Project Manager, briefed the laboratory directors at AMTEX Day held in Albuquerque, New Mexico on July 19.

This briefing was followed by an AMTEX Operating Committee meeting on July 21. A joint laboratory/industry kickoff meeting was held at [TC]^2 on August 23. In addition, several members of the project team participated at the 1994 Bobbin Show held in Atlanta, Georgia from September 26 through 30.

Financial Summary (DOE $ in thousands)

($K)	(A) Total Budget*	(B) Quarter Cost	(C) Cost to Date	(D) Remaining Balance (A-C)	(E) % Spent of Budget (C/A)	(F) Funds Authorized	(G) Remaining Balance (F-C)	(H) % Spent of Auth. (C/F)
Program Office	1,945	548	1,659	286	85%	1,945	286	85%
DAMA	10,370	2,286	7,479	2,891	72%	9,054	1,575	83%
CAFE	3,700	1,147	1,906	1,794	52%	3,362	1,456	57%
TReC	3,250	1,096	1,782	1,468	55%	2,389	607	75%
EEF	400	98	107	293	27%	200	93	54%
Cutting	1,000	209	209	791	21%	810	601	26%
Sensors	500	82	100	400	20%	460	360	22%
Cotton Biotech	61	37	37	24	61%	50	13	74%
TA Leaders	181	35	136	45	75%	181	45	75%
FY93 TACT Oper	250	0	250	0	100%	250	0	100%
Misc Support	150	0	150	0	100%	150	0	100%
Uncommitted	2,793	0	0	2,793	0%	0	0	0%
Total	$24,600	$5,538	$13,815	$10,785	56%	$18,851	$5,036	73%

* Total Budget is the total for current CRADAs which will terminate between January and April 1995. (See Project Summary Reports in Appendix A of this quarterly report for details.)

OPERATIONS AND PROGRAM MANAGEMENT

The AMTEX Operating Committee (AOC) provides the operational oversight, approves the long-range strategic plan including project priorities and budgets, and selects the program office and project leaders for the partnership. The Operating Committee consists of representatives from the textile industry, government, and the laboratories.

Program Office Operations and Management

The Program Office provides management oversight of the daily operational and project activities of the AMTEX Partnership and is composed of an industry and a laboratory component. The following activities were conducted this quarter.

Project Initiation

- All but 1 of the 35 CRADAs required for the initial 6 projects were completed by quarter end. The one remaining CRADA, for the Electronic Embedded Fingerprint project, was in the final review and approval process.

- The project plan for the Cotton Biotechnology Project was prepared and approved by the AMTEX and DOE Program Offices. The CRADA for Brookhaven National Laboratory (BNL) was approved by the Laboratory and DOE Program Offices. The CRADA for Lawrence Berkeley Laboratory was in preparation.

- The Textile Research Institute (TRI) hired a project manager (Jack Scruggs) to lead the industry effort in developing the proposed new project, On-line Process Control for Flexible Fiber Manufacturing, or OPCon. Scruggs and a group of fiber industry representatives held workshops and meetings to develop the prioritized list of R&D requirements for the OPCon project.

Operating Committee Activities and Actions for the Quarter

The AMTEX Operating Committee met on July 21, 1994, hosted by the SNL in Albuquerque, New Mexico. The major items of business were:

Project Status Reports

The laboratory/industry project managers reported the status and accomplishments of the six initial projects that follow:

Computer-Aided Fabric Evaluation
Textile Resource Conservation
Demand Activated Manufacturing Architecture
Electronic Embedded Fingerprinting
Rapid Cutting
Sensors for Agile Manufacturing

CRADA/Project Development Process Status Report

The results of a study of the time required to develop AMTEX projects from concepts through the start of work was presented. The initial conclusions and the resulting plan of action to improve the process were discussed.

Budget Discussion and Approval

Dick Quisenberry described the role and function of the Industry Technical Advisory Committee (ITAC). These responsibilities included reviewing project concepts, reviewing progress and prioritizing projects, and recommending budgets based on that prioritization and the funding available. He then summarized the results of the ITAC meeting held the previous week where projects were reviewed and budget recommendations were developed.

A new project in Cotton Biotechnology has been under development for several months. The ITAC recommended that it be approved for FY95. A motion was made and seconded that the Cotton Biotechnology Project be formally approved. The motion was approved unanimously.

Quisenberry also reported the ITAC recommended the Textile Research Institute (TRI) develop a plan for a project in Flexible Fiber Production with the first area of emphasis to be On-line Process Control. After the plan is developed and reviewed by the ITAC, it will be brought back to the ITAC for review and to the AOC for consideration for funding. An amount of $500K was set aside in the budget for this project.

A motion was made and seconded to approve the ITAC budget recommendation. The motion was approved unanimously.

Discussion of Industry R&D Road Map

Dick Quisenberry then summarized the outcome of an ITAC subcommittee that had done some initial scoping of the industry R&D Road Map. Quisenberry will lead an industry effort to develop an industry Road Map.

Technology Display at the Bobbin Show

With the theme, AMTEX -- Building the Road to the Future, the AMTEX projects were showcased at the Bobbin Show in September. The technology displays highlighted the technical accomplishments of the first few months of AMTEX operation. The display attracted hundreds of visitors and attention from the trade and national press.

Media and Press Relations

The media relations effort for AMTEX's Bobbin trade show exhibit was the highlight of this quarter's work. More than 300 updated press kits were prepared and widely distributed. Through personal phone calls and constant communication, the AMTEX team garnered coverage and interviews on CNN's science and technology show, the New York Times business technology section, and flagship industry trade publications such as Textile World, America's Textile International, and Daily News Record. Time magazine was contacted and requested an interview focusing on the DAMA project.

Media relations managed well over 200 news media contacts, some referred by DOE and industry. The news release on TReC received widespread coverage in textile trades, federal technology and national environmental publications, as did the 1-year *progress report* news release included in the new press kit.

PROJECT ACCOMPLISHMENTS

Accomplishments during the last quarter within the AMTEX Partnership have been numerous. A review of those accomplishments for each AMTEX project is contained in the following paragraphs.

Computer-Aided Fabric Evaluation (CAFE)

The CAFE project is developing inspection systems that will provide U.S. textile manufacturers with a major leap forward in the assurance of high quality, consistent textiles.

Project Managers: Glenn Allgood, ORNL/615-574-5673
Marty Ellis, ITT/803-595-0035

Performance Related to Milestones

At the end of fiscal year 1994 , the CAFE project remains on or ahead of schedule. The primary focus for the first year's effort is the development of the On-Line Greige Inspection system and its proof-of-operation in the Alpha Test that will occur in April 1995. An addition to this focus is the development of the CAFE Economic Model, the CAFE Systems Architecture Document, and the Proof-of-Principle Color Printed Pattern Goods.

Specific to these deliverables, the milestones for this quarter were as follows.

1. On-Line Greige Inspection System Functional Description and Requirements Document. Issued for review.

2. Alpha Test Configuration for On-Line Greige System. Issued for review.

3. Build of RGB Pattern Recognition and Colorimetric Imaging prototype system. Field deployment December 1994.

4. Completion of field tests, experiments, and preliminary design of the Machine Diagnostics System. (System is part of On-Line Greige Inspection System.)

5. Preliminary hardware design for Alpha Test implementation of On-Line Greige Inspection System. This design includes all sensor suites and modifications necessary to support (2).

6. A 70% completion of Cost/Benefits Analysis of Defects Vs. Sensor Suite.
7. Design, fabrication, and build of test bed for inspection of printed fabrics.

Activities and Technical Accomplishments for the Quarter

1. Completion of preliminary field tests and experimentation for developing a Machine Diagnostics for looms (OLG).

2. Design and build of RGB Pattern Recognition and Colorimetric Imaging prototype system (CPPG).

3. On-Line Greige Inspection System Functional Description and Requirements Document (OLG/CPE).

4. Alpha Test Configuration for On-Line Greige System (OLG/CPE).

5. Design, fabrication, and build of test bed for inspection of printed fabrics (CPPG).

6. CAFE Defect Image and Analysis Database (CPE).

7. Preliminary Color Printed Pattern Goods Inspection System Functional Description and Requirements Document (OLG/CPE).

Issues, Major Problems, and Resolutions

None to report this quarter.

Explanation of Variances

None to report this quarter.

Plans for Next Quarter

The main focus areas for next quarter are:

1. Finalization of On-Line Greige Functional Description and Requirements Document.

2. Finalization of Alpha Test Configuration for On-Line Greige Inspection System.

3. Field deployment of RGB Pattern Recognition and Colorimetric Imaging.

4. Completion of CAFE Defect Image and Analysis Database and initiation of remote file-server operation.

5. Final design and deployment initiation of On-Line Greige Inspection System for Alpha Test configuration.

6. Machine Vision Workshop.

Invention Disclosures

None.

Publications/Presentations

Publications

Submitted for review:

CAFE Functional Description and Requirements Document
State-of-the-Art Analysis Document
Industry Survey
On-Line Greige Inspection System Functional Description and Requirements Document
Alpha Test Configuration Document

Presentations

Team demonstration of a test bed that inspects printed fabrics, the Bobbin Show in Atlanta, Georgia, during the week of September 26, 1994.

Laboratory/Industry Quarterly Review Meeting held at LLNL and LBL on September 20 and 21, 1994.

Textile Resource Conservation (TReC)

The objective of the TReC project is to define, develop, integrate, and deliver processes, devices, and techniques to be used by all elements of the U.S. Textile and Soft Goods product chain to enhance environmental quality and minimize the production of wastes.

Project Managers: Paul Farber, ANL/708-252-6522
Don Alexander, ITT/803-595-0035

Performance Related to Milestones

Performance related to milestones has met expectations during the current quarter. Detailed analyses for proof-of-concepts have been completed, as well as some of the preliminary economic analysis for process concepts. The Solid Fibrous Waste Recovery team has almost completed a comparative economic analysis for a separation and recovery system. Due to a delay in initiating this task at the participating laboratory, industry training on polarographic techniques for metals speciation will be postponed until next quarter.

Quarterly Activities and Technical Accomplishments

The TReC Project had its first project review meeting at ANL on August 23 and 24, 1994. Attended by over 100 representatives of the U.S. textile industry, DOE, and the national laboratories, the meeting provided the first comprehensive look at the progress of the TReC Project. Presentations were made at the meeting by the principal investigators and Laboratory Task Coordinators for all of the TReC-sponsored tasks. In addition, an excellent review of the current state of AMTEX was given by Dr. Richard Quisenberry, the Industry Program Manager. Reaction by the textile Industry Research Partners was overwhelmingly favorable toward the research accomplished by the national laboratory researchers, considering that only a few months have elapsed since many CRADAs started.

Investigators from the national laboratories showed methods for separating and recovering dyes from dye baths, and polyester and cotton from scrap apparel. New analytical techniques that could be used to aid in waste water treatment, but could also help the industry in quality control during manufacture, caused many favorable comments. Innovative techniques that could be used to clean parts and equipment faster, and with less environmental impact, than conventional methods also drew favorable comment. The evaluation, by the Industry Research Partners, of these presentations will help shape the TReC Project in FY95, and provide the basis for commercializing those techniques and procedures needed earliest by the textile industry.

The Industry Partners task teams met during the month of September to evaluate the progress of individual task efforts. The evaluations from the industry task teams and their recommendations for future work will be given to the Project Managers in October, for preparation of the FY95 project plan. The Strategic Planning for Energy Conservation task team has issued a Call for Concepts to the national laboratories, based on needs

developed by a joint industry/laboratory effort. These concepts will be reviewed by the industry/laboratory team in the next quarter and the recommendations forwarded to the Project Managers.

Issues, Major Problems, and Resolutions

The mix of tasks the industry prioritized for FY95 called for more work in Energy Research laboratories than the original budgets would allow. Through cooperation among the TReC project leaders, the Program Office and DOE program managers, this issue was resolved and alternate funding made available. Continuity between FY94 and FY95 funding is also being addressed to ensure that no disruption of work occurs.

Explanation of Variances

Variances in milestones and deliverables from the Project Plan are minor. Some variances in the Metals Speciation research have been due to delivery problems with dye samples to the principal investigators and to late initiation dates in laboratory CRADAs. Other variances in the project have been due to some slight modification in the direction of some laboratory efforts. Based on textile industry teams' discussions with the principal investigators, such modifications will better align national laboratory research efforts with textile industry needs.

Plans for Next Quarter

During the next quarter (October through December 1994) laboratory researchers whose work will continue into FY95 will refine concepts substantiated in FY94. The laboratory and industry Project Managers will assemble the new Project Plan for the research and development efforts in FY95 to be reviewed/approved by the AMTEX Program Office and the DOE.

Invention Disclosures

No invention disclosures have been reported to the TReC Project Office during this quarter.

Publications/Presentations

No publications or presentations were reported to the Project Manager's Office during this quarter.

Demand Activated Manufacturing Architecture (DAMA)

The objective of the DAMA project is to define, develop, integrate, and deliver an electronic marketplace system/structure that can be used by all elements of the U.S. textile industry. DAMA will enable companies to reduce customer complaints and requests for apparel on demand, and to establish new strategic alliances to create business opportunities. These steps will enhance industry productivity and competitiveness in the world marketplace.

Project Managers: Lee Cheatham, PNL/509-375-2674
Jim Lovejoy, $[TC]^2$/919-380-2184

Performance Related to Milestones

DAMA planned four major deliverables for FY1994. Each deliverable has been completed as follows:

1. Baseline Model Document -- The *wrinkle-free* slacks product team completed its work in collecting knowledge-base information from the industry through the industry team members. This information is being codified in a model for use in industry analysis. Additionally, two product teams have been formed and will begin work after reviewing the accomplishments of the first product team.

2. Opportunities Assessment Document -- This item was completed in the third quarter of FY 1994 and is discussed in that report.

3. Demonstrations -- As described previously, DAMA deployed a successful major demonstration of progress at the 1994 Bobbin Show.

4. DAMA Plans -- The DAMA project completed 1994 1-year and 1994-1998 5-year plans in the first quarter of FY1994. In addition, Project Management restructured the project to enhance communication, integration, and execution. The details of this restructuring were presented at the steering committee meeting and at a peer review and appear in the FY 1995 plans.

Activities

Project managers are working to streamline and focus the activity of the tasks, building on experiences from the first six months of the project's funded life. A *critical mass* of industry research partners has been created, with additional recruiting continuing. Liaison efforts with the Garment industry Development Corporation, and others is expected to lead to greater participation and access to smaller apparel firms.

Most task areas have focused on the first major demonstration of DAMA progress at the Bobbin Show. Additionally, all task areas have prepared for and successfully completed the first peer review of the project, in conjunction with the Bobbin show. Task areas have completed progress in their respective functional areas, including collection of information from industry experts in an Enterprise Understanding product team development of requirements.

Issues, Major Problems, and Resolutions

None to report.

Explanation of Variances

No significant variance to report.

Plans For Next Quarter

DAMA will begin immediately to implement the restructuring effort and plans to complete this by the end of the first quarter in FY 1995. Highlights of restructuring, and progress and plans by task follow.

Highlights of Restructuring

1. Select from industry one overall project manager.
2. Establish a laboratory technical project manager.
3. Eliminate co-chairs and name one individual per task as an executive manager.
4. Rationalize task structure as follows:

From	To
Enterprise Understanding	Enterprise Modeling and Simulation
Simulation Tools	Learning Labs (rationalized into Education and Outreach task)
Information Infrastructure	Connectivity and Infrastructure
Information Access Tools	Rationalized into Cooperative Business Management Tools task)
Decision Analysis Tools	Cooperative Business Management Tools

From	To
Communications and Education	Education and Outreach
Opportunity Assessment	Rationalized into Project and Task Management
Integrated Demonstrations	Rationalized into Education and Outreach

Progress and plans by task:

The following five items apply to all new tasks. Fourth quarter 1994 progress and plans for first quarter 1995 are detailed in succeeding lists.

1. Completing FY95 plans
2. Completing Peer Review
3. Completing Annual Report
4. Completing Monthly Reports
5. Completing Quarterly Reports

Task (FY 94 Terminology)

Enterprise Understanding

4th Qtr 94 Progress	1st Qtr 95 Plans
• Changed to Enterprise Modeling and Simulation to reflect focused scope work • Completed collection of knowledge base from initial product team • Codified knowledge base information model	• Restructure under one task leader • Launch two new industry product teams • Continue information model development • Complete baseline model document

Information Infrastructure

4th Qtr 94 Progress	1st Qtr 95 Plans
• Changed to Connectivity and Infrastructure to reflect focused scope of work • Created DAMA Directory • Created Initial DAMA World Wide Web (WWW) Home Pages to Demo at Bobbin Show	• Restructure under one task leader • Develop preliminary infrastructure specification • Establish liaison with major national information infrastructure providers

- Demonstrated APTEC at Bobbin Show
- Established e-mail connectivity among research partners
- Developed Preliminary Electronic Commerce Specification
- Develop prototype implementation of electronic commerce through WWW

Information Access Tools

4th Qtr 94 Progress

- Completed front-end and data handling development of trial *electronic yellow pages*
- Developed cooperative alliance with Atari, Inc. for development of user-friendly front-end to DAMA

1st Qtr 95 Plans

- Rationalize under Cooperative Business Management Tools
- Complete reports on industry practices, opportunities, and tools
- Test integrated demonstration of market-place (Auburn Database)

Decision Analysis Tools

4th Qtr 94 Progress

- Changed to Cooperative Business Management Tools to reflect focused scope of work
- Selected Forecasting Tool
- Specified requirements for tool

1st Qtr 95 Plans

- Restructure under one task leader
- Develop pilots for forecasting and sourcing
- Develop framework for CBM Tools
- Develop Demo Module (for use at Quick Response 95 conference in March 1995)

Simulation Tools

4th Qtr 94 Progress

- Completed development of Learning Lab frame-work
- Completed development of initial simulation tool for Learning Lab
- Executed demonstration of this tool at the 1994 Bobbin Show

1st Qtr 95 Plans

- Rationalize under Education and Outreach task
- Develop value chain model
- Produce simulation user requirements document

Communication and Education

4th Qtr 94 Progress	1st Qtr 95 Plans
• Changed to Education and Outreach to reflect focused scope of work • Executed demonstration at Bobbin Show, including materials, media and feedback • Retained Jessica Glicken, SNL, for focused development of vision statement and key messages for FY95 • Restructured under one task leader	• Evaluate feedback from 1994 Bobbin Show • Develop groundwork for next generation of materials • Develop key messages for FY 95 • Other items of task rationalized into Education and Outreach task

Opportunities Assessment

4th Qtr 94 Progress	1st Qtr 95 Plans
• Rationalized under Project and Task Management	

Integrated Demonstrations

4th Qtr 94 Progress	1st Qtr 95 Plans
• Completed demonstrations roadmap for DAMA • Completed successful demonstration at 1994 Bobbin Show	• Rationalize under Education and Outreach task

Invention Disclosures

None.

Publications / Presentations

None to report.

Electronic Embedded Fingerprints (EEF)

The Electronic Embedded Fingerprint project is developing miniature electronic devices as permanent identification and information markers for textiles and apparel.

Project Managers: Mike Riley, LLNL/510-422-3045
Jim Caldwell, [TC]²/919-380-2156

Performance Related to Milestones

Identification of the leading edge tagging technology companies is nearly complete. Members from PNL and LLNL plan to attend a radio frequency identification device (RFID) exposition at [TC]². This trip should complete the data acquisition portion of the assessment. A report will then be prepared with all the details of the technology assessment.

Both PNL and LLNL provided EEF demonstrations for the AMTEX Bobbin Show booth (week of September 28). PNL showed a revolving garment rack that moved EEF tagged garments past a radio frequency (RF) reader. Each read-only garment tag triggered a unique video display response as it was read: an image of the garment, as well as pertinent inventory parameters, was displayed. The LLNL display demonstrated read/write tags embedded within men's dress shirts. The information content of these tags was also displayed on a video monitor as they were passed over a countertop RF reader. In addition, the capability of writing new information to these tags was demonstrated.

Judging by the number of inquiries and media attention, a considerable amount of interest exists in the concept of electronically tagging garments. (Descriptions of the demonstration were aired on CNN and printed in the New York Times.) Discussions with several garment manufacturers again indicated that cost is the primary driver for acceptance of the technology.

Activities and Technical Accomplishments for the Quarter

Team members attended the AMTEX Laboratory Project Managers' Workshop, June 29 and 30.

Preparation of an EEF criteria form for desirable parameter fields to include in an EEF display is underway by an industry group headed by Amy Walker of Levi Strauss and Ron Gilbert of PNL. They will also

generate a set of performance specifications for team guidance in selecting potential EEF developers and producers.

Issues, Major Problems, and Resolutions

The LLNL CRADA has been sent to [TC]^2 for sign off. It should be approved in early October.

Explanation of Variances

LLNL is behind schedule, due to a delay in the start of work.

Plans for Next Quarter

In the next quarter, the technology assessment and statement of industrial needs will continue. In addition, EEF will work with [TC]^2 to host an RF Exposition, after which the team hopes to begin working closely with a company to develop tag technology suitable for AMTEX purposes.

Invention Disclosures

None.

Publications/Presentations

July 19 - AMTEX Day, Albuquerque, New Mexico, National Laboratory Directors

July 21 - AMTEX Operating Committee update (presented by Kevin Widener because of Michael Riley schedule conflict)

August 23 - EEF project kick-off presentations by Michael Riley and R.onald Gilbert at [TC]^2

Rapid Cutting

The Rapid Cutting project is developing a new generation of cutting systems and technological advancements in current systems that will improve cutting quality and efficiency. Such systems will enable true demand activated manufacturing of apparel. The Rapid Cutting project consists of six national laboratories, each with laser and optical technologies appropriate for the mechanical cutting of textiles using new materials and photonics.

All teams were actively underway with their tasks during this quarter.

Project Managers: Craig Fong, LBL/510-486-5298
Jim Caldwell, [TC]²/919-380-2156

Performance Related to Milestones

Phase One consists of proof-of-principle experiments to meet the longer term objectives of 200 inches/second single ply, single garment cutting and piece part sequencing at a target capital cost of $50K. Also included are near-term technology applications for commercial lasers and blade cutting systems. An aggregate start date was August 1, 1994, with the period of performance concluding January 15, 1995, the date for a major technical project review. This review earmarks task specific milestones. Task descriptions and a brief assessment of status follows:

Task 1 - Improved Blades - Provide new post manufacturing and new materials for cutting edges and blade bodies. Progress: blades from industry received, processed, and manufactured an initial trial lot for the Bobbin Show. Status: On schedule.

Task 2 - Advanced Cutting Heads - Provide improvements to existing automated commercial cutters. Progress: alpha typical drivers now being fabricated. Status: On schedule.

Task 3.1 - CO_2, YAG:Nd Lasers - Provide improvements to commercial laser sources and optical transport systems. Progress: fabricated cutting box for lab lasers and conducted first trial cuts on textiles. Status: On schedule.

Task 3.2 - UV Cutting - Develop next generation systems and test new laser sources for textile cutting. Progress: trial cuts on textiles has commenced. Status: On schedule.

Task 3.3 - Solid State Laser Cutting - Test several next generation laser sources for textile cutting. Progress: The LLNL CRADA is still in the approval process. The final Joint Work Statement/ Statement of Work (JWS/SOW) is being reviewed by the local operations office. Status: Two months behind budget and schedule benchmarks. A recovery plan has been formulated.

Task 4 - Material Handling - Develop cost effective single garment piece part sorting and sequencing systems. Progress: System requirements, site evaluations, and a conceptual design effort have started. Control algorithms have also been identified. Status: On schedule.

Task 5 - Task Management - Level of effort management for these tasks. Progress: Almost all of the work is underway. Status: On schedule.

Activities and Technical Accomplishments for the Quarter

In addition to the accomplishments discussed previously, the following notable events have taken place:

- Industry/Laboratory Meeting - this quarterly meeting was held at $[TC]^2$, Raleigh, North Carolina to further define tasks, and to identify industry and laboratory teams and needed resources.

- Bobbin Show - examples of cutting blades and a project brochure were prepared and distributed at the annual American Apparel Manufacturers Association (AAMA) Bobbin Show, September 28, 1994, in Atlanta, Georgia.

- Tours of Industry Partners site visits are continually occurring. A basic understanding of industry challenges is accumulating.

Issues, Major Problems, and Resolutions

Task 3.3 (Solid State Laser Cutting) has not yet started. The CRADA JWS/SOW is still in the funding approval process. As mentioned, the work package is being reviewed by the LLNL operations office. Approval and commencement of work is expected within the next quarter. Because of the Task 3.3 budget of $130K for Phase One and the time remaining, the basic task effort rate will be accelerated. With this acceleration, deliverables for Task 3.3 are expected to be on schedule for the January 1995 major milestone and project review. Issues of CRADA processing times are being addressed by the critical institutions.

Explanation of Variances

Refer to Issues section.

Plans for Next Quarter

Task 1 - Complete processing and fabrication of blades. Develop the test plan. Identify beta test sites.

Task 2 - Continue the fabrication of alpha typical magnetic drivers and power supplies. Commence evaluation testing.

Task 3. 1- Continue with optimization testing.

Task 3.2 - Continue with characterization test cutting for two key laser wavelengths.

Task 3.3 - Commence the test cutting for other laser wavelengths.

Task 4 - Continue the development of the conceptual design and development plan.

Task 5 - Continue the level of effort and generate the Project Plan for the ensuing phases.

Sensors for Agile Manufacturing

The Sensors for Agile Manufacturing (SFAM) project team is developing sensors that will allow the automation of sewing processes to improve product quality and process productivity in the apparel manufacturing sector of the U.S. Textile Industry.

All participating laboratories (PNL, ANL, and SNL) have signed CRADAs and have received funding by the end of the quarter. Early bench-scale laboratory work on the felled seam task has begun at all three laboratories.

Project Managers: Kevin Widener, PNL/509-375-2487
Jim Caldwell, [TC]²/919-380-2156

Performance Related to Milestones

No milestones were scheduled for completion during this quarter.

Activities and Technical Accomplishments for the Quarter

Several design iterations on the felled seam sensors were resolved this quarter. Researchers from SNL visited Levi Strauss in El Paso, Texas (hosted by Gene Croyle). They attained a much better understanding for the sensor requirements.

[TC]² hosted a joint industry/laboratory project team meeting on August 23 in Cary, North Carolina. Individual principal investigators presented preliminary laboratory bench results. The majority of the meeting time was used to identify sensor applications that can have potentially large impacts on the manufacture of sewn products.

Project technical staff visited numerous apparel manufacturing booths at the 1994 Bobbin Show. Attendance at this show was of tremendous benefit as a training tool to the laboratory personnel.

Issues, Major Problems, and Resolutions

None to report this quarter.

Explanation of Variances

None to report this quarter.

Plans for Next Quarter

Technical work with prototype sensor development will continue at the laboratories.

A report on the felled seam sensor work at PNL is anticipated for completion in the next quarter.

The laboratories will continue preliminary sensor design work. Kevin Widener will brief DOE HQ on November 8 in Washington, D.C. Jim Caldwell , $[TC]^2$, and Kevin Widener, PNL, will present a project status report at the AMTEX Operating Committee meeting in Wilmington, Delaware on November 10.

FINANCIAL SUMMARY

Appendix A contains program financial summary information.

APPENDIX A

AMTEX FINANCIAL SUMMARY

PROGRAM SUMMARY REPORT

1. IDENTIFICATION (CONTRACT NO.)	2. TITLE	3. REPORTING PERIOD
21286	AMTEX PROGRAM	4TH QUARTER FY 1994

4a. PARTICIPANT NAME AND ADDRESS	4b. CLIENT NAME AND ADDRESS	5. START DATE
AMTEX LABORATORY PROGRAM OFFICE PACIFIC NORTHWEST LABORATORY RICHLAND, WASHINGTON 99352	U.S. DEPARTMENT OF ENERGY WASHINGTON, DC 20585	OCTOBER 1993 6. COMPLETION DATE SEPTEMBER 1994

7. PROJECT YEAR: FY 1994

8. COST STATUS

a. $ EXPRESSED IN: THOUSANDS

b. BUDGET & REPORTING NO./SUB. ACCT NO.: KU-01-00-000; GB-01-06-010

c. FIN. NO.:

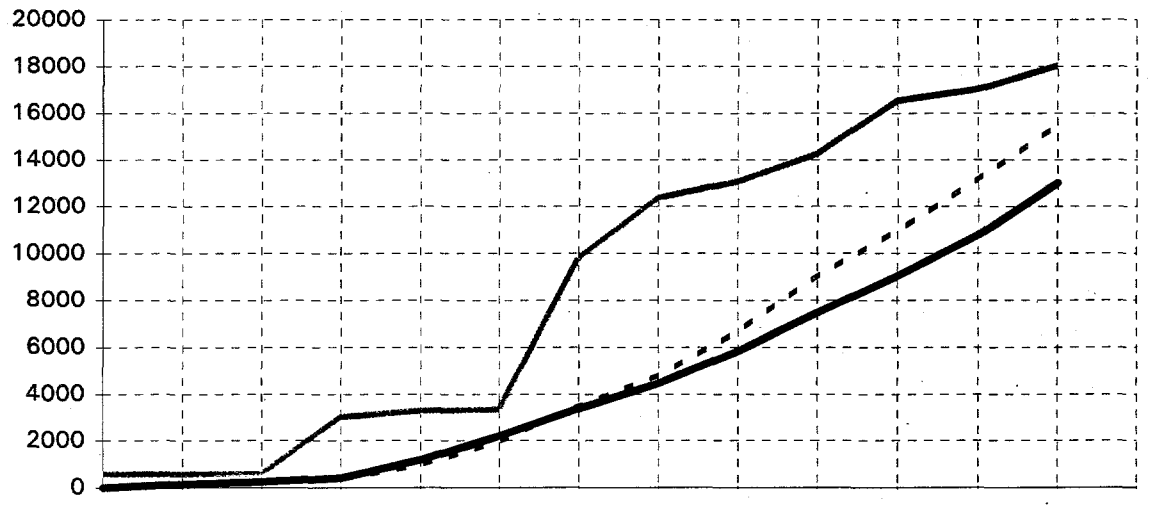
d. ACTUAL COSTS PRIOR YEARS: $818

e. ER BUDGET: $13,782

f. DP BUDGET: $10,000

g. ER FUNDS AUTH: $12,258

h. DP FUNDS AUTH: $5,776



LEGEND: PLANNED ACTUAL PROJECTED FUNDS AUTH 90% SPENT

		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
i. ER COSTS	PLANNED	146	97	137	400	600	900	900	1200	1600	1400	1600	1600
	ACTUAL	146	98	175	612	631	799	699	1018	1246	1191	1314	1399
	VARIANCE	0	-1	-38	-212	-31	101	201	182	354	210	287	201
	CUM PLANNED	146	243	380	780	1380	2280	3180	4380	5980	7380	8980	10580
	CUM ACTUAL	146	244	419	1031	1662	2461	3160	4178	5424	6614	7928	9327
	CUM VARIANCE	0	-1	-39	-251	-282	-181	20	202	556	766	1052	1253
j. DP COSTS	PLANNED	0	0	0	200	400	600	400	700	750	550	600	700
	ACTUAL	0	0	0	153	386	387	370	363	377	380	424	830
	VARIANCE	0	0	0	47	14	213	30	337	373	170	176	-130
	CUM PLANNED	0	0	0	200	600	1200	1600	2300	3050	3600	4200	4900
	CUM ACTUAL	0	0	0	153	539	926	1296	1659	2036	2416	2840	3670
	CUM VARIANCE	0	0	0	47	61	274	304	641	1014	1184	1360	1230
k. TOTAL COSTS	PLANNED	146	97	137	600	1000	1500	1300	1900	2350	1950	2200	2300
	ACTUAL	146	98	175	765	1017	1186	1069	1381	1623	1571	1738	2229
	VARIANCE	0	-1	-38	-165	-17	314	231	519	727	380	463	71
	CUM PLANNED	146	243	380	980	1980	3480	4780	6680	9030	10980	13180	15480
	CUM ACTUAL	146	244	419	1184	2201	3387	4456	5837	7460	9030	10768	12997
	CUM VARIANCE	0	-1	-39	-204	-221	93	324	843	1570	1950	2412	2483

9. MILESTONES

(REFER TO INDIVIDUAL PROJECT REPORTS)

Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep

10. NAME OF PARTICIPANT'S PROGRAM MANAGER

DOUGLAS K LEMON

PROJECT SUMMARY REPORT

1. IDENTIFICATION (CONTRACT NO.)	2. TITLE	3. REPORTING PERIOD
21286	AMTEX PROGRAM OFFICE	4TH QUARTER FY 1994

4a. PARTICIPANT NAME AND ADDRESS	4b. CLIENT NAME AND ADDRESS	5. START DATE
AMTEX PROGRAM OFFICE PACIFIC NORTHWEST LABORATORY RICHLAND, WASHINGTON 99352	U.S. DEPARTMENT OF ENERGY WASHINGTON, DC 20585	OCTOBER 1993 6. COMPLETION DATE SEPTEMBER 1994

7. PROJECT YEAR: FY 1994

8. COST STATUS

a. $ EXPRESSED IN: THOUSANDS

b. BUDGET & REPORTING NO./SUB. ACCT NO.: KU-01-00-000

c. FIN. NO.:

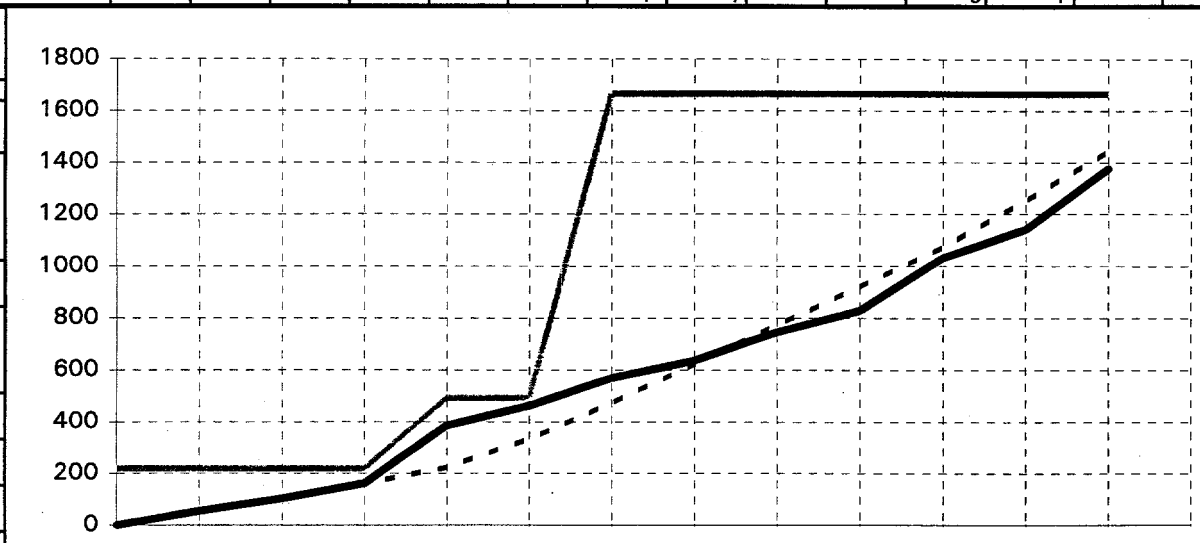
d. ACTUAL COSTS PRIOR YEARS: $281

e. ER BUDGET *: $1,664

f. DP BUDGET *: $0

g. ER FUNDS AUTH: $1,664

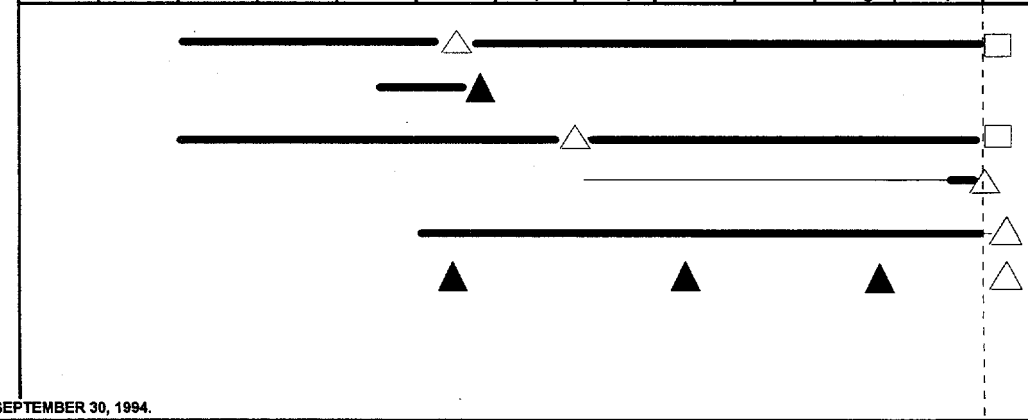
h. DP FUNDS AUTH: $0



LEGEND: PLANNED ACTUAL PROJECTED FUNDS AUTH 90% SPENT

		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
i. ER COSTS	PLANNED	56	48	59	60	110	140	150	150	150	150	180	192
	ACTUAL	56	48	59	223	78	106	69	108	85	203	107	238
	VARIANCE	0	0	0	-163	33	34	81	42	65	-53	73	-46
	CUM PLANNED	56	104	163	223	333	473	623	773	923	1073	1253	1445
	CUM ACTUAL	56	104	163	386	463	569	638	746	831	1034	1140	1378
	CUM VARIANCE	0	0	0	-163	-130	-96	-15	27	92	39	113	67
j. DP COSTS	PLANNED	0	0	0	0	0	0	0	0	0	0	0	0
	ACTUAL	0	0	0	0	0	0	0	0	0	0	0	0
	VARIANCE	0	0	0	0	0	0	0	0	0	0	0	0
	CUM PLANNED	0	0	0	0	0	0	0	0	0	0	0	0
	CUM ACTUAL	0	0	0	0	0	0	0	0	0	0	0	0
	CUM VARIANCE	0	0	0	0	0	0	0	0	0	0	0	0
k. TOTAL COSTS	PLANNED	56	48	59	60	110	140	150	150	150	150	180	192
	ACTUAL	56	48	59	223	78	106	69	108	85	203	107	238
	VARIANCE	0	0	0	-163	33	34	81	42	65	-53	73	-46
	CUM PLANNED	56	104	163	223	333	473	623	773	923	1073	1253	1445
	CUM ACTUAL	56	104	163	386	463	569	638	746	831	1034	1140	1378
	CUM VARIANCE	0	0	0	-163	-130	-96	-15	27	92	39	113	67

9. MILESTONES



* BUDGETS COVER EFFORTS THROUGH SEPTEMBER 30, 1994.

LEGEND: SCHEDULED, COMPLETED, DEVIATION, TIMELINE, PROGRESS, PROPOSED DEVIATION, APPROVED DEVIATION

10. NAME OF PARTICIPANT'S PROJECT MANAGER: DOUGLAS K LEMON

PROJECT SUMMARY REPORT

1. IDENTIFICATION (CONTRACT NO.)	2. TITLE	3. REPORTING PERIOD
21286	DEMAND-ACTIVATED MANUFACTURING ARCHITECTURE (DAMA)	4TH QUARTER FY 1994

4a. PARTICIPANT NAME AND ADDRESS	4b. CLIENT NAME AND ADDRESS	5. START DATE / 6. COMPLETION DATE
AMTEX LABORATORY PROGRAM OFFICE PACIFIC NORTHWEST LABORATORY RICHLAND, WASHINGTON 99352	U.S. DEPARTMENT OF ENERGY WASHINGTON, DC 20585	5. START DATE: OCTOBER 1993 6. COMPLETION DATE: SEPTEMBER 1994

7. PROJECT YEAR: FY 1994

8. COST STATUS

a. $ EXPRESSED IN: THOUSANDS

b. BUDGET & REPORTING NO./SUB. ACCT NO.: KU-01-00-000; GB-01-06-010

c. FIN. NO.:

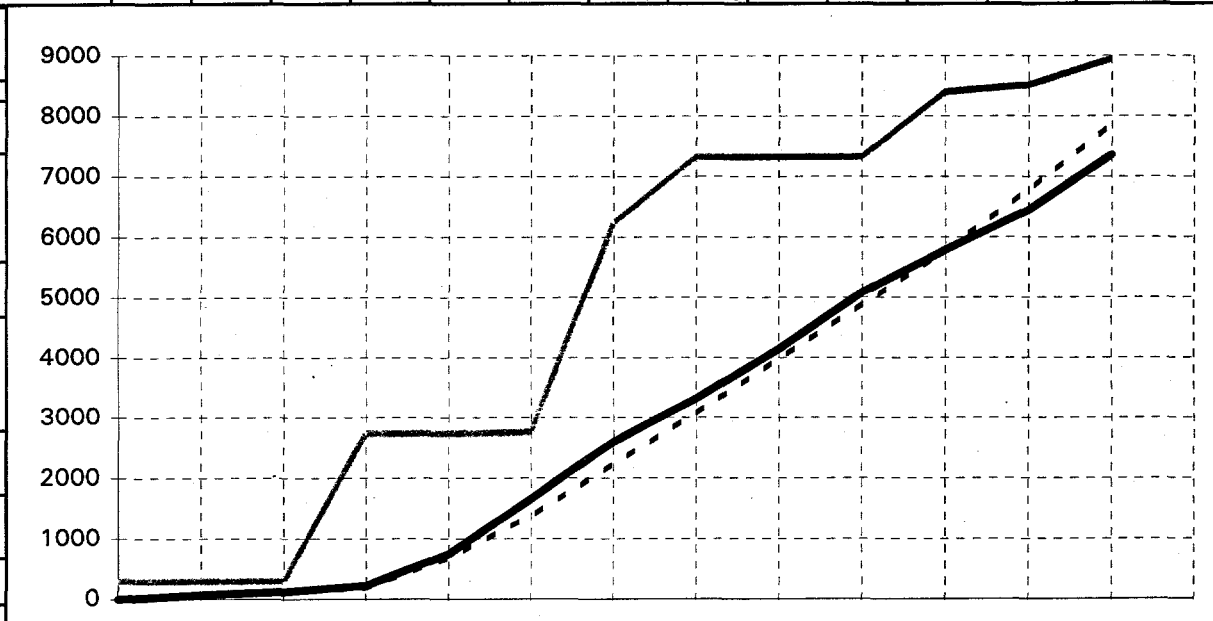
d. ACTUAL COSTS PRIOR YEARS: $111

e. ER BUDGET *: $6,949

f. DP BUDGET *: $3,310

g. ER FUNDS AUTH: $5,679

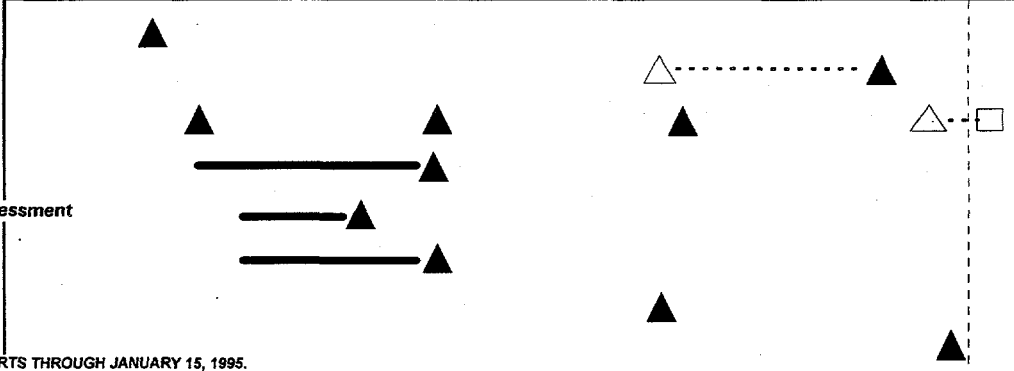
h. DP FUNDS AUTH: $3,264



LEGEND: PLANNED ACTUAL PROJECTED FUNDS AUTH 90% SPENT

		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
i. ER COSTS	PLANNED	71	44	67	300	400	500	550	600	600	600	700	753
	ACTUAL	71	46	105	371	530	580	422	525	669	485	560	553
	VARIANCE	0	-2	-38	-71	-130	-80	128	75	-69	115	140	200
	CUM PLANNED	71	115	182	482	882	1382	1932	2532	3132	3732	4432	5185
	CUM ACTUAL	71	117	222	593	1123	1702	2124	2649	3318	3803	4363	4916
	CUM VARIANCE	0	-2	-40	-111	-241	-320	-192	-117	-186	-71	69	269
j. DP COSTS	PLANNED	0	0	0	200	300	350	300	300	300	300	300	328
	ACTUAL	0	0	0	154	386	360	295	303	266	223	96	369
	VARIANCE	0	0	0	46	-86	-10	5	-3	34	77	204	-41
	CUM PLANNED	0	0	0	200	500	850	1150	1450	1750	2050	2350	2678
	CUM ACTUAL	0	0	0	154	540	900	1194	1498	1764	1987	2083	2452
	CUM VARIANCE	0	0	0	46	-40	-50	-44	-48	-14	63	267	226
k. TOTAL COSTS	PLANNED	71	44	67	500	700	850	850	900	900	900	1000	1081
	ACTUAL	71	46	105	525	916	940	717	828	935	708	656	922
	VARIANCE	0	-2	-38	-25	-216	-90	133	72	-35	192	344	159
	CUM PLANNED	71	115	182	682	1382	2232	3082	3982	4882	5782	6782	7863
	CUM ACTUAL	71	117	222	747	1662	2602	3319	4147	5082	5790	6446	7368
	CUM VARIANCE	0	-2	-40	-65	-280	-370	-237	-165	-200	-8	336	495

9. MILESTONES



* BUDGETS COVER CURRENT CRADA EFFORTS THROUGH JANUARY 15, 1995.

LEGEND: SCHEDULED, COMPLETED, DEVIATION, TIMELINE, PROGRESS, PROPOSED DEVIATION, APPROVED DEVIATION

10. NAME OF PARTICIPANT'S PROJECT MANAGER: R LEE CHEATHAM

PROJECT SUMMARY REPORT

1. IDENTIFICATION (CONTRACT NO.)	2. TITLE	3. REPORTING PERIOD
21286	COMPUTER-AIDED FABRIC EVALUATION (CAFE)	4TH QUARTER FY 1994

4a. PARTICIPANT NAME AND ADDRESS	4b. CLIENT NAME AND ADDRESS	5. START DATE
AMTEX LABORATORY PROGRAM OFFICE PACIFIC NORTHWEST LABORATORY RICHLAND, WASHINGTON 99352	U.S. DEPARTMENT OF ENERGY WASHINGTON, DC 20585	OCTOBER 1993
		6. COMPLETION DATE SEPTEMBER 1994

7. PROJECT YEAR: FY 1994

8. COST STATUS

a. $ EXPRESSED IN: THOUSANDS

b. BUDGET & REPORTING NO./SUB. ACCT NO.: KU-01-00-000; GB-01-06-010

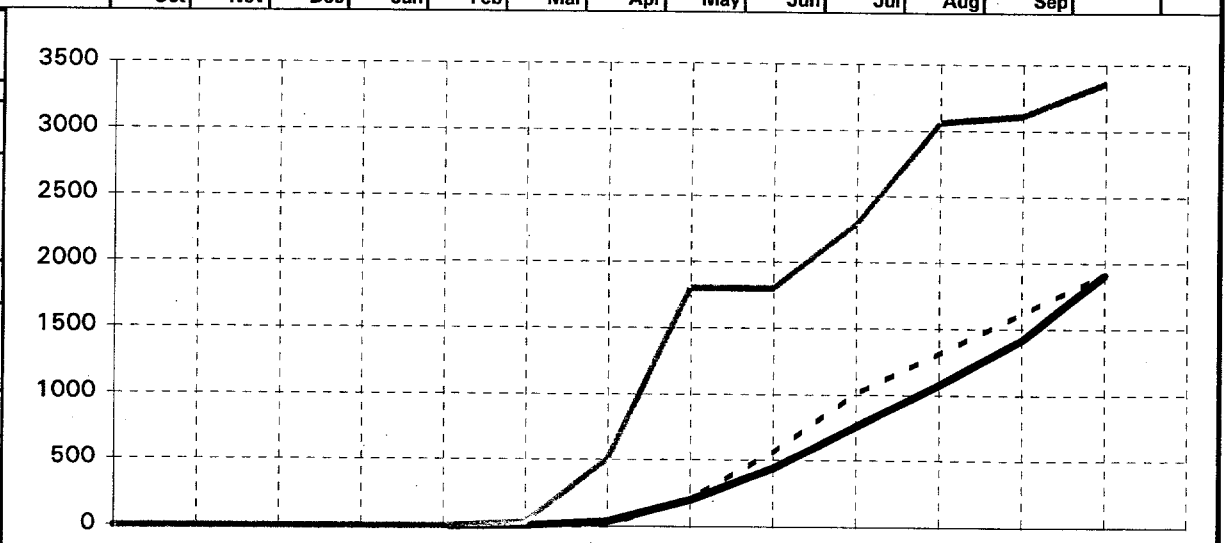
c. FIN. NO.:

d. ACTUAL COSTS PRIOR YEARS: $0

e. ER BUDGET *: $2,450

f. DP BUDGET *: $1,250

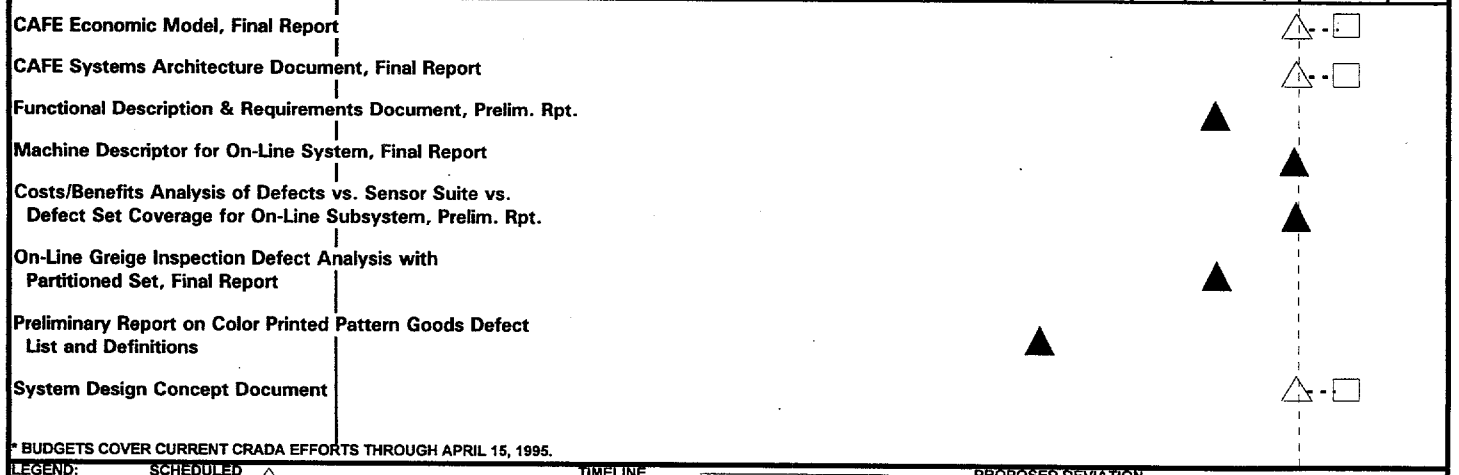
g. ER FUNDS AUTH: $1,675; $1,687



LEGEND: PLANNED ACTUAL PROJECTED FUNDS AUTH 90% SPENT

		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
i. ER COSTS	PLANNED	0	0	0	0	7	6	100	150	200	190	190	190
	ACTUAL	0	0	0	0	7	6	88	175	234	211	195	229
	VARIANCE	0	0	0	0	0	0	12	-25	-34	-21	-5	-39
	CUM PLANNED	0	0	0	0	7	13	113	263	463	653	843	1033
	CUM ACTUAL	0	0	0	0	7	13	101	276	510	721	916	1145
	CUM VARIANCE	0	0	0	0	0	0	12	-13	-47	-68	-73	-112
j. DP COSTS	PLANNED	0	0	0	0	0	0	100	200	250	110	110	110
	ACTUAL	0	0	0	0	0	27	75	60	87	108	140	264
	VARIANCE	0	0	0	0	0	-27	25	140	163	2	-30	-154
	CUM PLANNED	0	0	0	0	0	0	100	300	550	660	770	880
	CUM ACTUAL	0	0	0	0	0	27	102	162	249	357	497	761
	CUM VARIANCE	0	0	0	0	0	-27	-2	138	301	303	273	119
k. TOTAL COSTS	PLANNED	0	0	0	0	7	6	200	350	450	300	300	300
	ACTUAL	0	0	0	0	7	33	163	235	321	319	335	493
	VARIANCE	0	0	0	0	0	-27	37	115	129	-19	-35	-193
	CUM PLANNED	0	0	0	0	7	13	213	563	1013	1313	1613	1913
	CUM ACTUAL	0	0	0	0	7	40	203	438	759	1078	1413	1906
	CUM VARIANCE	0	0	0	0	0	-27	10	125	254	235	200	7

9. MILESTONES



* BUDGETS COVER CURRENT CRADA EFFORTS THROUGH APRIL 15, 1995.

LEGEND: SCHEDULED △ COMPLETED ▲ DEVIATION □ TIMELINE PROGRESS PROPOSED DEVIATION APPROVED DEVIATION

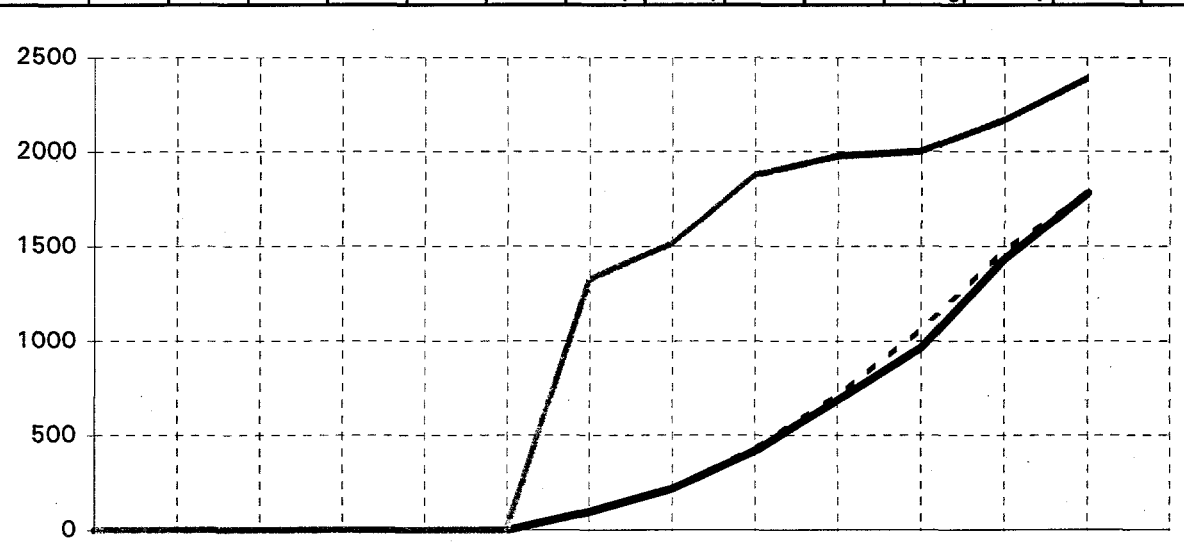
10. NAME OF PARTICIPANT'S PROJECT MANAGER
GLENN ALLGOOD (ORNL)

PROJECT SUMMARY REPORT

1. IDENTIFICATION (CONTRACT NO.)	2. TITLE	3. REPORTING PERIOD
21286	TEXTILE RESOURCE CONSERVATION (TReC)	4TH QUARTER FY 1994

4a. PARTICIPANT NAME AND ADDRESS	4b. CLIENT NAME AND ADDRESS	5. START DATE / 6. COMPLETION DATE
AMTEX LABORATORY PROGRAM OFFICE PACIFIC NORTHWEST LABORATORY RICHLAND, WASHINGTON 99352	U.S. DEPARTMENT OF ENERGY WASHINGTON, DC 20585	5. START DATE: OCTOBER 1993 6. COMPLETION DATE: SEPTEMBER 1994

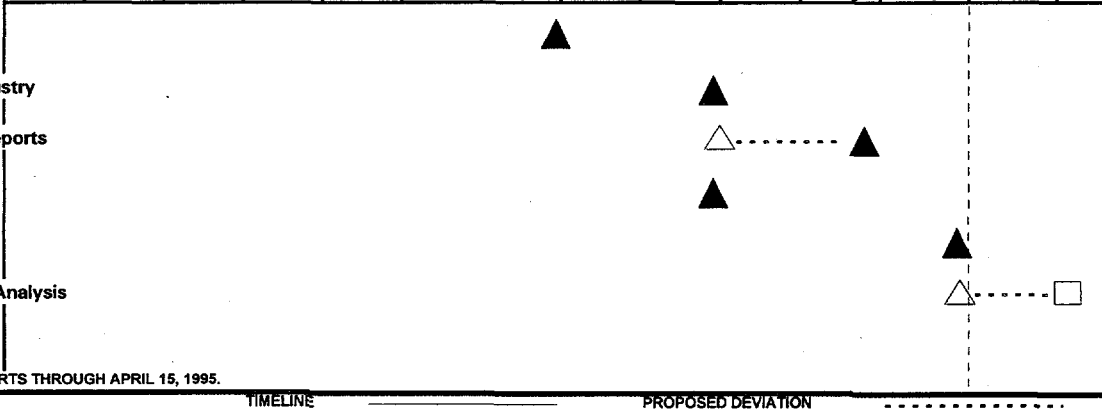
7. PROJECT YEAR	8. COST STATUS	a. $ EXPRESSED IN	b. BUDGET & REPORTING NO./SUB. ACCT NO.	c. FIN. NO.	d. ACTUAL COSTS PRIOR YEARS	e. ER BUDGET *	f. DP BUDGET *	g. ER FUNDS AUTH	h. DP FUNDS AUTH
FY 1994		THOUSANDS	KU-01-00-000 GB-01-06-010		$0	$2,675	$575	$1,969	$420



LEGEND: PLANNED ACTUAL PROJECTED FUNDS AUTH 90% SPENT

		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
i. ER COSTS	PLANNED	0	0	0	0	0	100	120	170	200	250	350	200
	ACTUAL	0	0	0	0	0	97	120	198	247	228	326	224
	VARIANCE	0	0	0	0	0	3	0	-28	-47	22	24	-24
	CUM PLANNED	0	0	0	0	0	100	220	390	590	840	1190	1390
	CUM ACTUAL	0	0	0	0	0	97	217	415	662	890	1216	1440
	CUM VARIANCE	0	0	0	0	0	3	3	-25	-72	-50	-26	-50
j. DP COSTS	PLANNED	0	0	0	0	0	0	0	40	80	100	70	100
	ACTUAL	0	0	0	0	0	0	0	0	24	49	144	125
	VARIANCE	0	0	0	0	0	0	0	40	56	51	-74	-25
	CUM PLANNED	0	0	0	0	0	0	0	40	120	220	290	390
	CUM ACTUAL	0	0	0	0	0	0	0	0	24	73	217	341
	CUM VARIANCE	0	0	0	0	0	0	0	40	96	147	73	49
k. TOTAL COSTS	PLANNED	0	0	0	0	0	100	120	210	280	350	420	300
	ACTUAL	0	0	0	0	0	97	120	198	271	277	470	349
	VARIANCE	0	0	0	0	0	3	0	12	9	73	-50	-49
	CUM PLANNED	0	0	0	0	0	100	220	430	710	1060	1480	1780
	CUM ACTUAL	0	0	0	0	0	97	217	415	686	962	1433	1782
	CUM VARIANCE	0	0	0	0	0	3	3	15	24	98	47	-2

9. MILESTONES



* BUDGETS COVER CURRENT CRADA EFFORTS THROUGH APRIL 15, 1995.

LEGEND: SCHEDULED COMPLETED DEVIATION TIMELINE PROGRESS PROPOSED DEVIATION APPROVED DEVIATION

10. NAME OF PARTICIPANT'S PROJECT MANAGER

PAUL S FARBER (ANL)

PROJECT SUMMARY REPORT

1. IDENTIFICATION (CONTRACT NO.)	2. TITLE	3. REPORTING PERIOD
21286	ELECTRONIC EMBEDDED FINGERPRINT (EEF)	4TH QUARTER FY 1994

4a. PARTICIPANT NAME AND ADDRESS	4b. CLIENT NAME AND ADDRESS	5. START DATE
AMTEX LABORATORY PROGRAM OFFICE PACIFIC NORTHWEST LABORATORY RICHLAND, WASHINGTON 99352	U.S. DEPARTMENT OF ENERGY WASHINGTON, DC 20585	OCTOBER 1993
		6. COMPLETION DATE SEPTEMBER 1994

7. PROJECT YEAR: FY 1994

8. COST STATUS

a. $ EXPRESSED IN: THOUSANDS

b. BUDGET & REPORTING NO./SUB. ACCT NO.: KU-01-00-000 / GB-01-06-010

c. FIN. NO.:

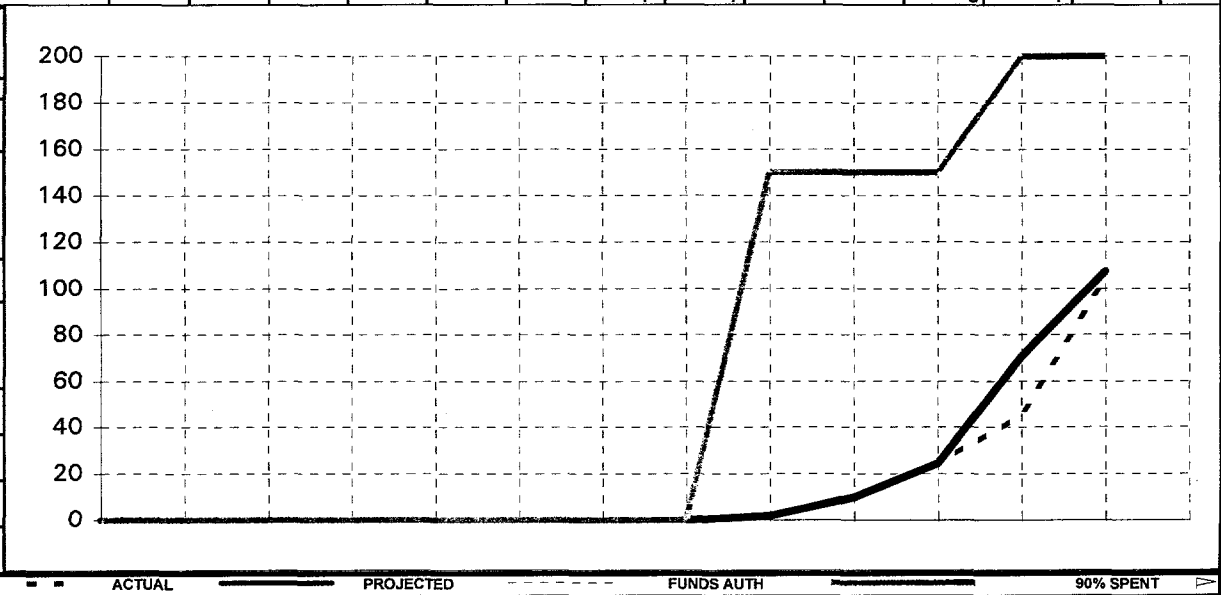
d. ACTUAL COSTS PRIOR YEARS: $0

e. ER BUDGET *: $150

f. DP BUDGET *: $250

g. ER FUNDS AUTH: $150

h. DP FUNDS AUTH: $50



LEGEND: PLANNED ACTUAL PROJECTED FUNDS AUTH 90% SPENT

		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
i. ER COSTS	PLANNED	0	0	0	0	0	0	0	2	8	15	20	20
	ACTUAL	0	0	0	0	0	0	0	2	8	15	16	28
	VARIANCE	0	0	0	0	0	0	0	0	0	1	4	-8
	CUM PLANNED	0	0	0	0	0	0	0	2	10	25	45	65
	CUM ACTUAL	0	0	0	0	0	0	0	2	10	25	40	69
	CUM VARIANCE	0	0	0	0	0	0	0	0	0	1	5	-4
j. DP COSTS	PLANNED	0	0	0	0	0	0	0	0	0	0	0	40
	ACTUAL	0	0	0	0	0	0	0	0	0	0	30	8
	VARIANCE	0	0	0	0	0	0	0	0	0	0	-30	32
	CUM PLANNED	0	0	0	0	0	0	0	0	0	0	0	40
	CUM ACTUAL	0	0	0	0	0	0	0	0	0	0	30	39
	CUM VARIANCE	0	0	0	0	0	0	0	0	0	0	-30	1
k. TOTAL COSTS	PLANNED	0	0	0	0	0	0	0	2	8	15	20	60
	ACTUAL	0	0	0	0	0	0	0	2	8	15	46	37
	VARIANCE	0	0	0	0	0	0	0	0	0	1	-26	23
	CUM PLANNED	0	0	0	0	0	0	0	2	10	25	45	105
	CUM ACTUAL	0	0	0	0	0	0	0	2	10	25	71	107
	CUM VARIANCE	0	0	0	0	0	0	0	0	0	1	-26	-2

9. MILESTONES

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Bobbin Show Demo												▲

NOTE: BUDGETS COVER CURRENT CRADA EFFORTS THROUGH JANUARY 15, 1995.

LEGEND: SCHEDULED △ COMPLETED ▲ DEVIATION □ TIMELINE PROGRESS PROPOSED DEVIATION APPROVED DEVIATION

10. NAME OF PARTICIPANT'S PROJECT MANAGER

MIKE RILEY (LLNL)

PROJECT SUMMARY REPORT

1. IDENTIFICATION (CONTRACT NO.)	2. TITLE	3. REPORTING PERIOD
21286	RAPID CUTTING	4TH QUARTER FY 1994

4a. PARTICIPANT NAME AND ADDRESS	4b. CLIENT NAME AND ADDRESS	
AMTEX LABORATORY PROGRAM OFFICE PACIFIC NORTHWEST LABORATORY RICHLAND, WASHINGTON 99352	U.S. DEPARTMENT OF ENERGY WASHINGTON, DC 20585	5. START DATE OCTOBER 1993 6. COMPLETION DATE SEPTEMBER 1994

7. PROJECT YEAR
FY 1994

8. COST STATUS

a. $ EXPRESSED IN
THOUSANDS

b. BUDGET & REPORTING NO./SUB. ACCT NO.
KU-01-00-000
GB-01-06-010

c. FIN. NO.

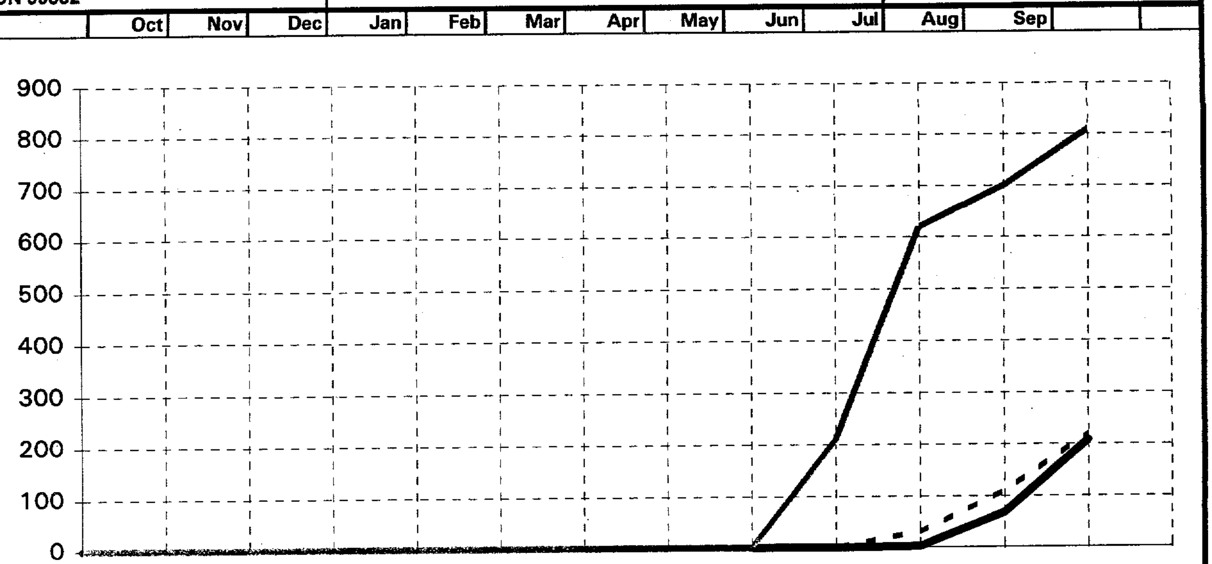
d. ACTUAL COSTS PRIOR YEARS
$0

e. ER BUDGET *
$650

f. DP BUDGET *
$350

g. ER FUNDS AUTH
$650

h. DP FUNDS AUTH
$160



LEGEND: PLANNED ▬ ▬ ACTUAL ▬▬▬ PROJECTED - - - - - - - FUNDS AUTH ▬▬▬ 90% SPENT ▷

		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
i. ER COSTS	PLANNED	0	0	0	0	0	0	0	0	0	20	60	80
	ACTUAL	0	0	0	0	0	0	0	0	0	2	54	87
	VARIANCE	0	0	0	0	0	0	0	0	0	18	6	-7
	CUM PLANNED	0	0	0	0	0	0	0	0	0	20	80	160
	CUM ACTUAL	0	0	0	0	0	0	0	0	0	2	56	143
	CUM VARIANCE	0	0	0	0	0	0	0	0	0	18	24	17
j. DP COSTS	PLANNED	0	0	0	0	0	0	0	0	0	10	20	30
	ACTUAL	0	0	0	0	0	0	0	0	0	0	12	55
	VARIANCE	0	0	0	0	0	0	0	0	0	10	9	-25
	CUM PLANNED	0	0	0	0	0	0	0	0	0	10	30	60
	CUM ACTUAL	0	0	0	0	0	0	0	0	0	0	12	66
	CUM VARIANCE	0	0	0	0	0	0	0	0	0	10	19	-6
k. TOTAL COSTS	PLANNED	0	0	0	0	0	0	0	0	0	30	80	110
	ACTUAL	0	0	0	0	0	0	0	0	0	2	66	141
	VARIANCE	0	0	0	0	0	0	0	0	0	28	15	-31
	CUM PLANNED	0	0	0	0	0	0	0	0	0	30	110	220
	CUM ACTUAL	0	0	0	0	0	0	0	0	0	2	68	209
	CUM VARIANCE	0	0	0	0	0	0	0	0	0	28	43	11

9. MILESTONES	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Lab/Industry Partnering Meeting											▲	
Fabricate Initial Mechanical Blades for Bobbin Show												▲
Perform Initial Photonics Cuts												▲

NOTE: BUDGETS COVER CURRENT CRADA EFFORTS THROUGH JANUARY 15, 1995.

LEGEND: SCHEDULED △ COMPLETED ▲ DEVIATION □ TIMELINE ──── PROGRESS ▬▬▬ PROPOSED DEVIATION • • • • • • APPROVED DEVIATION ▬ ▬ ▬ ▬ ▬

10. NAME OF PARTICIPANT'S PROJECT MANAGER
CRAIG FONG (LBL)

PROJECT SUMMARY REPORT

1. IDENTIFICATION (CONTRACT NO.)	2. TITLE	3. REPORTING PERIOD
21286	SENSORS FOR AGILE MANUFACTURING	4TH QUARTER FY 1994

4a. PARTICIPANT NAME AND ADDRESS	4b. CLIENT NAME AND ADDRESS	5. START DATE / 6. COMPLETION DATE
AMTEX LABORATORY PROGRAM OFFICE PACIFIC NORTHWEST LABORATORY RICHLAND, WASHINGTON 99352	U.S. DEPARTMENT OF ENERGY WASHINGTON, DC 20585	5. START DATE: OCTOBER 1993 6. COMPLETION DATE: SEPTEMBER 1994

7. PROJECT YEAR
FY 1994

8. COST STATUS
a. $ EXPRESSED IN
THOUSANDS

b. BUDGET & REPORTING NO./SUB. ACCT NO.
KU-01-00-000
GB-01-06-010

c. FIN. NO.

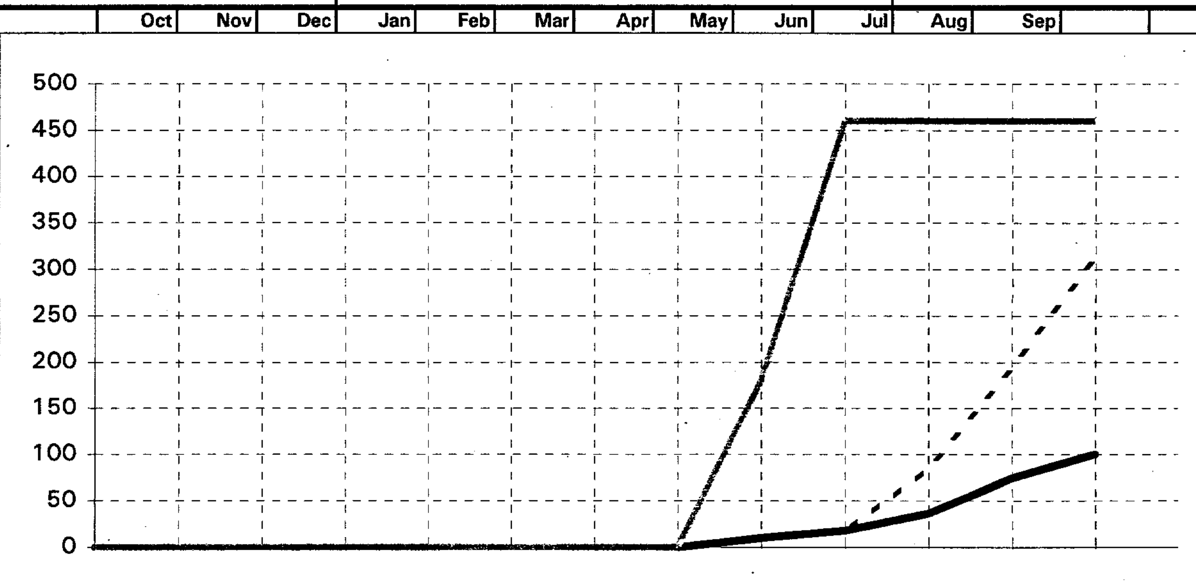
d. ACTUAL COSTS PRIOR YEARS
$0

e. ER BUDGET *
$280

f. DP BUDGET *
$220

g. ER FUNDS AUTH
$280

h. DP FUNDS AUTH
$180



LEGEND: PLANNED ▬ ▬ ACTUAL ▬▬▬ PROJECTED - - - - - - - FUNDS AUTH ▬▬▬ 90% SPENT ▷

		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
i. ER COSTS	PLANNED	0	0	0	0	0	0	0	10	8	40	70	75
	ACTUAL	0	0	0	0	0	0	0	10	8	18	36	17
	VARIANCE	0	0	0	0	0	0	0	0	0	22	34	58
	CUM PLANNED	0	0	0	0	0	0	0	10	18	58	128	203
	CUM ACTUAL	0	0	0	0	0	0	0	10	18	36	73	89
	CUM VARIANCE	0	0	0	0	0	0	0	0	0	22	55	114
j. DP COSTS	PLANNED	0	0	0	0	0	0	0	0	0	26	40	46
	ACTUAL	0	0	0	0	0	0	0	0	0	0	2	9
	VARIANCE	0	0	0	0	0	0	0	0	0	26	38	37
	CUM PLANNED	0	0	0	0	0	0	0	0	0	26	66	112
	CUM ACTUAL	0	0	0	0	0	0	0	0	0	0	2	11
	CUM VARIANCE	0	0	0	0	0	0	0	0	0	26	64	101
k. TOTAL COSTS	PLANNED	0	0	0	0	0	0	0	10	8	66	110	121
	ACTUAL	0	0	0	0	0	0	0	10	8	18	38	26
	VARIANCE	0	0	0	0	0	0	0	0	0	48	72	95
	CUM PLANNED	0	0	0	0	0	0	0	10	18	84	194	315
	CUM ACTUAL	0	0	0	0	0	0	0	10	18	36	75	100
	CUM VARIANCE	0	0	0	0	0	0	0	0	0	48	119	215

9. MILESTONES	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Lab/Industry Kick-off Meeting											▲	
Participate in Bobbin Show												▲

NOTE: BUDGETS COVER CURRENT CRADA EFFORTS THROUGH JANUARY 15, 1995.

LEGEND: SCHEDULED △ TIMELINE ──── PROPOSED DEVIATION - - - - - - - - - - -
COMPLETED ▲ DEVIATION ☐ PROGRESS ▬▬▬ APPROVED DEVIATION ▬ ▬ ▬ ▬ ▬

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