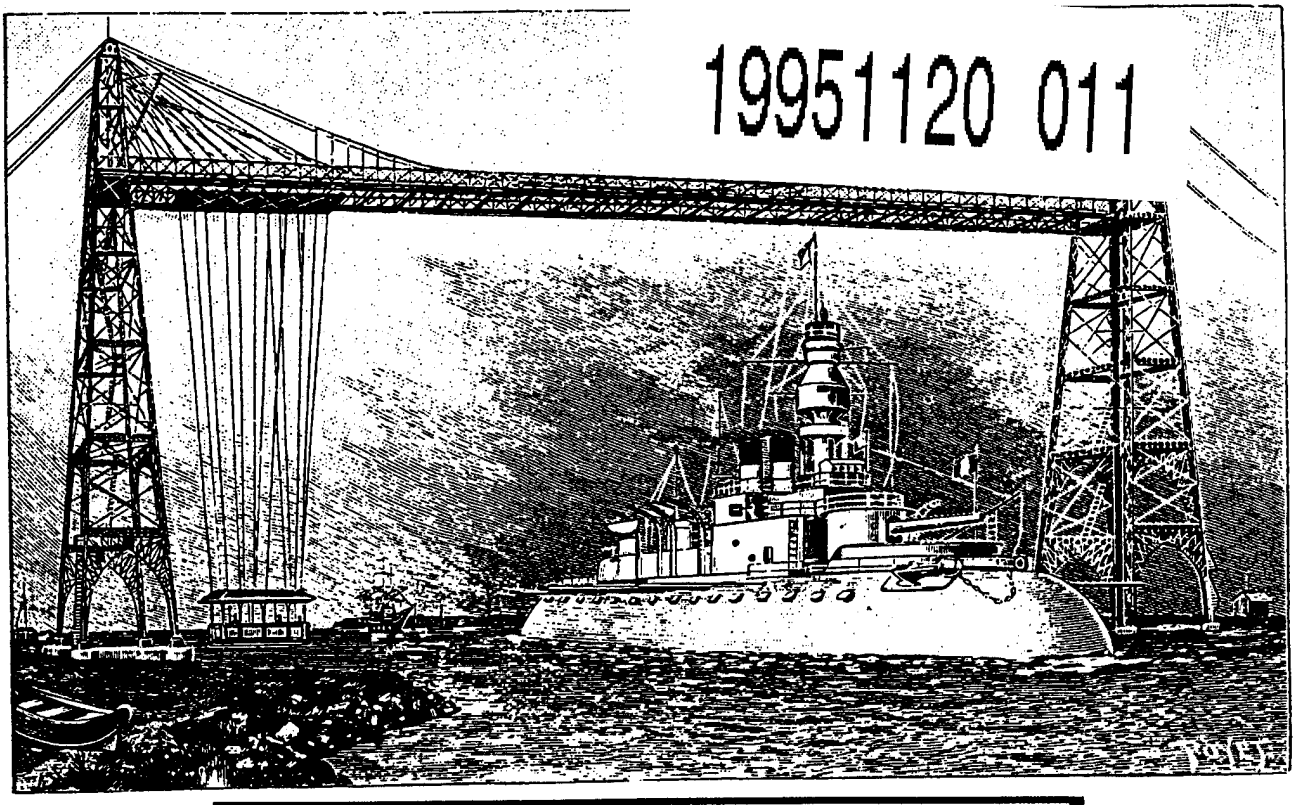
GULF COAST REGION MARITIME TECHNOLOGY CENTER

Quarterly Report

95 - GCRMTC - QR03

July 1, 1995 - September 30, 1995



GULF COAST REGION MARITIME TECHNOLOGY CENTER

QUARTERLY REPORT

95-GCRMTC-QR03

Cooperative Agreement N00014-94-2-0011

REPORT PERIOD: Jul 1, 1995 - Sep 30, 1995

SUBMITTED TO: Mr. Dale Rome
Acting Director
Shipbuilding Technology Office
Carderock Division
Naval Surface Warfare Center

SUBMITTED BY:
Gulf Coast Region Maritime Technology Center
New Orleans, LA

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EXECUTIVE SUMMARY

The Gulf Coast Region Maritime Technology Center (GCRMTC) was initiated September 26, 1994 and is now fully operational. The infrastructure buildup consisting of renovation of facilities and initial acquisitions of research equipment, computer hardware and software is nearly complete. The Center has filled all its positions at both sites (Orange Site and New Orleans Site) except for a few project manager positions at the Orange Site. The Center has been designated as a Navy Center of Excellence in Advanced Marine Technology.

Based on Government/Industry Advisory Board recommendations and approval of the Government Program Manager, the Center issued five Requests for Proposals based on five approved Concept (Stage II Problem) Statements. The Center also issued a second call for Concept Statements from the marine industry.

The GCRMTC initiated the Environmental Resources and Information Center (ERIC) June 1995. The Center, which is colocated at the New Orleans Site is a depository and resource for environmental issues of concern to the shipbuilding/marine industries. ERIC is fully operational, and its operations and services are fully detailed on the World Wide Web.

Status reports on 17 collaborative research projects being conducted at both sites are appended for reference. Research projects being conducted at both sites are in collaboration with shipbuilding/marine industry partners.

The Orange Site has completed its Simulation-Based Design facility at Orange, Texas. The Site has initiated several collaborative projects with selected NSRP Panels and shipbuilding/marine industries.

GCRMTC QUARTERLY REPORT
July 1 to September 30, 1995

1. INTRODUCTION

The Gulf Coast Region Maritime Technology Center (GCRMTC) was initiated September 26, 1994 and is now fully operational. The Center has been designated as a Navy Research Center of Excellence in Advanced Marine Technology.

As part of the Center's mission, research is carried out at both the New Orleans Site and its Orange Site. The Center also solicits concept ideas for collaborative research twice a year from maritime industries and then issues RFP's under the guidance and direction of its Government/Industry Advisory Board (GIAB) and the Government Program Manager. All research sponsored by the Center at both Center Sites and with the marine industries is collaborative research.

2. REQUEST FOR PROPOSALS

Based on the recommendations of the GIAB regarding concept proposals (Stage II Problem Statements) the Center formulated requests for proposals, RFP's, in the following five areas:

1. Establishing a Benchmark for Worldwide Marine Machinery and Equipment Manufacturing
2. Automated Machine Learning of Diesel Engine Operating Characteristics
3. An Investigation of the Expansion of the GCRMTC Ships' Reliability, Availability and Maintainability (RAM) database
4. Development of a Portfolio of Ship Designs
5. Automated Off-Line Programming: A Strategic Tool to Link the Design and Manufacturing Processes

After approval of the RFP's by the Government Program Manager, the University of New Orleans issued the RFP's on July 21, 1995. The proposals were due at the GCRMTC on September 15, 1995 and are undergoing external peer reviews.

3. CONCEPT PROPOSAL SOLICITATION

In mid-August, the Center sent a solicitation for Concept Proposals to over 375 industry and academic sources. Approximately 50 responses were received which are currently undergoing external peer review. After presentation to the Government/Industry Advisory Board in December, approved industry Concept Proposals will be converted into Requests for Proposals (RFP's), which will be issued in January 1996. Additionally, research proposals at each Site that pass GIAB review will be converted to full research proposals (in order of priorities and consistent with available funding) and presented to the Government Program Manager for final approval and funding.

A master schedule of events (Appendix A) depicts time frames for both the RFP and Concept Proposal solicitations.

4. INITIATION OF CENTERS

The GCRMTC was originally committed to initiating four Centers — Simulation-Based Design Center, Shipbuilding Environmental Resource Center, Shipbuilding Process and Products Standards Center, and a Marketing Resource Center. Based on the workshop held February 22-23, 1995 it was decided to table the Shipbuilding Process and Products Standards Center.

4.1 GCRMTC Environmental Resource Information Center

A support staff for ERIC has been established. The administrative staff consists of a director, a resource manager, an office administrator, and a manager for information services. Additionally, two part-time students have been employed to assist in specific projects and tasks. The position required for developing and maintaining the electronic database and library information services was filled. However, the individual has resigned and a replacement will be sought. As part of ERIC's rapid response to issues involving the shipbuilding industry, two specialists were also engaged to work with a Navy/Industry Task Group.

A number of environmental data bases can now be accessed on the World Wide Web. ERIC's internet address is http://www.uno.edu/~engr/eric.html. The WWW page provides information on ERIC's mission, personnel and e-mail addresses and provides access to the following:

NSRP Committee Project Reports
EPA Pollution Prevention Databases
North Carolina Waste Reduction Database
P-2EDGE (Battelle Northwest)
P2 Library (DOD Sponsored Program to integrate existing P2 databases)
Enviro$ense
LaTAP & UWMRC databases

Additional informational services are being planned for the internet system. These will include an expansion of the menu to provide current ERIC activities and projects, a condensed description of impending changes in regulatory requirements, and a computerized system for shipyards to gauge their progress in minimizing waste by-products.

ERIC will soon begin using the Bureau of National Affairs Environmental Library and Environmental Reporter to identify environmental regulations and issues of interest to the shipbuilding and repair industry as well as to prepare Environmental Bulletins for the ERIC Bulletin Board and to provide regular mailings to members of the network. ERIC's efforts in this area will include the smaller shipbuilding and repair yards and subcontractors who are not normally aware of NSRP activities and changes in Federal and state regulations.

A brochure has been developed to present the objectives and services offered by ERIC. Mailing lists of all shipyards and repair facilities in Louisiana (96) and in the United States (782) have been developed. A working relationship with the Louisiana Ship Building and Repair Association and the Offshore Marine Service Association has been established. Letters explaining ERIC's mission and soliciting their participation in the "ERIC NETWORK" have been sent to all Louisiana Companies. A national mailing is currently being prepared for distribution.

ERIC has scheduled a pollution prevention workshop in New Orleans for November 2, 1995, co-sponsored by LaTAP, Louisiana Ship Building and Repair Association, and the UNO Small Business Development Center. The topics include the proposed EPA pretreatment guidelines for Metal Products and Machinery and for air emissions associated with abrasive blasting. The focus will be on the role of pollution prevention in these two areas. ERIC plans to utilize the capabilities of LaTAP to conduct Pollution Prevention Opportunity Assessments for smaller shipyards around the country. This outreach effort will also include workshops on topics of current interest to local and regional organizations and associations.

ERIC's staff is currently involved in the new EPA Leadership Program, which involves 15 facilities nation-wide. The Puget Sound Naval Shipyard (PSNS) is one of these facilities. It is anticipated that ERIC staff will be involved in assisting the PSNS in the promotion of its existing Environmental Management Systems and Pollution Prevention Program.

As a member of the Navy/Industry Task Group studying the technical and economic impact of proposed Occupational Safety and Health Administration (OSHA) reductions in worker exposure levels for hexavalent chromium (Cr(VI)), ERIC personnel have completed their assigned tasks and are now assisting in the editing of the report. The report is being prepared to provide information on the impact of the proposed OSHA standard on Navy facilities, shipyards, and operations, as well as on the shipbuilding industry that provides weapon systems to the Navy. The Navy/Industry Task Group's primary focus was on the operations, materials, and processes that are expected to have a potential for exposing workers to hexavalent chromium. Special attention is focused on welding, cutting, and grinding of chromium-bearing materials since these operations were initially identified as having the most potential for an economic and technical impact. The necessity of working in enclosed and confined areas is another special concern for Navy facilities and shipyards in particular, and the shipbuilding industry in general. This report is being provided

to OSHA in response to its request for information on current worker exposure levels for Cr(VI) and on the technical and economic impact of the new standard.

ERIC personnel are in the communication link and have systematically attended the NSRP SP-1 and SP-3 Panel meetings. Personnel have made arrangements to attend the SP-1 and SP-3 Panel meeting being held in San Diego in October. Several of ERIC's projects have been found to be compatible with some of the NSRP projects, and every effort is being made to leverage the products produced. Contact has also been made with Navy and Air Force groups for cross referencing military specifications, NSN product codes, Material Safety Data Sheets, and Technical Orders or Bulletins.

ERIC and GCRMTC staff participated in the International Conference on Technologies for Marine Environment Preservation, MARIENV '95, during September 24-29, 1995. Three technical papers were written and presented by ERIC. These included a presentation on the environmental research efforts by the GCRMTC and an overview of U.S. environmental regulations as they affect the shipbuilding and maintenance industry. Other presentations involved the management of oil spills and other forms of organic pollution.

The activities conducted during the second quarter of 1995 by ERIC were directed at developing an infrastructure to address the environmental needs and regulatory impact on the shipbuilding industry. Some of these were identified in the GCRMTC Workshop 95-1 held February 22-23, 1995. Included in the objectives of ERIC is the ability to respond rapidly to issues such as the pending OSHA standards for reducing the tolerance levels of hexavalent chromium air emissions. The following tasks were conducted in support of the environmental focus of ERIC as part of the internal mission of the GCRMTC:

1. GCRMTC developed a one-year work plan for ERIC (budget and activities).

2. The Center has been asked to participate in a task force formed by NAVSEA to address the regulatory impact of a proposed OSHA Air Emission Standards. The task group has been established to formulate and execute a detailed plan of action to interface with OSHA personnel in preparing a draft report, and to present the Navy's position at public hearings. This report will assess the compliance methods necessary to cost effectively meet OSHA requirements and define the magnitude of economic, health and environmental problems. ERIC personnel have participated in the following activities:

   a. Establishing the project scope and tasks

   b. Conducting a Task Force Kick-Off meeting (April 27) and second meeting (May 24) in Arlington, VA at Westinghouse MTD

   c. Proposing GCRMTC/ERIC project activities to include laboratory testing, test evaluation and an analysis of the proposed test method

d. Developing a GCRMTC proposal for a phase 2, in-depth study on the issues of air emissions involving Cr^{+6}, MnO, and NiO with NAVSEA 03M and Newport News Shipbuilders, Inc.

3. GCRMTC expanded the existing environmental database at UNO to include NSRP and other reports and projects.

a. Conducted literature search of all NSRP reports and publications

b. Identified UNO's LaTAP (Louisiana Technical Assistance Program) resources that can be utilized by ERIC

c. Established contact with NAVSEA environmental staff and available databases

d. Prepared Technical Brief on Waste Reduction Alternatives for Painting and Coating

4. Efforts were made to establish effective government/industry relationships.

a. Identified 80 shipyards and repair companies in Louisiana

b. Attended and participated in NSRP SP-1 committee meeting activities in Jacksonville, Fla., June 1995

c. Investigated interim information for electronic database system, including interactive modem interface

The proposed activities for the next quarter include:

- Complete staffing plan for ERIC (job descriptions, search, etc.)
- Select electronic database system to serve long term needs
- Continue collection of selected reports and documents from, NSRP, EPA, etc.
- Maintain communication and activities with NSRP SP-1 committee
- Develop pollution prevention workshop for shipbuilding and repair industry with the LaTAP; two workshops are planned for August 1995 (New Orleans and Lake Charles, LA); review of these meetings will be made and used to develop a model for offering these workshops in other areas.
- Participate in national/international meetings to promote services and resources of benefit to U.S. shipbuilding
- Assist in completing the first draft of a report responding to the proposed OSHA Standards for reducing the allowable hexavalent chromium levels via air emissions; participate (if requested by NAVSEA) in public hearings concerning this issue; develop an in-depth research proposal (in concert with NAVSEA and private ship yards) to fully address the issue of the reduced Cr^{+6} and, also, MnO and NiO emission levels.
- Continue to develop network with local and national associations representing various aspects of the shipbuilding and repair industry (mailing lists, publications, newsletters, etc.)

5. MANUFACTURING TECHNOLOGY CONFERENCE

The Center joined the other Navy Centers of Excellence at a conference in Charleston, South Carolina. The purpose of the conference was to bring industry and government together in a forum to discuss possible collaborative efforts designed to ameliorate the effects of shipyard closings. A presentation concerning the Center's mission and objectives was delivered at the conference.

6. NEW ORLEANS SITE ACTIVITY REPORT

6.1 In-House Research Projects

Currently there are 12 research projects in various stages of progress. Quarterly reports of these research projects are attached as appendices to this report:

GCRMTC

GCRMTC Project No.

Title	Appendix
AMTC95-001B Inexpensive Non-Toxic Pigment Substitute for Chromium in Primer for Aluminum Substrate	B
AMTC95-008A Integrated Environmental Management Plan for Shipbuilding Facilities	C
AMTC95-010A Development of High Speed Marine Vehicle Design Database	D
AMTC95-014A Applications of Integrated Optical Fiber Sensor Systems in Shipbuilding and Shipboard Monitoring	E
AMTC95-016A Research in Shipboard Sensors	F
AMTC95-018A Ships' Reliability, Availability, and Maintainability (RAM) Database	G
AMTC95-020A Performance Simulation of Marine Propulsion Systems under Extreme Conditions	H
AMTC95-023B Study of Structural Design Procedures in the Shipbuilding Industry	I
AMTC95-027A Software Applications for Shipbuilding Optimization	J
AMTC95-030A Improving Technology in the Shipbuilding Industry	K
AMTC95-035A Digital Image Photogrammetry	L
AMTC95-036A Predicting Ship Roll Damping	M

6.2 Subcontracted Industry Research (NBDL)

A sub-contract was issued to the Naval Biodynamics Laboratory (NBDL) to carry out a research project, "Motion Sickness and Anti-Motion Sickness Treatment." The status of the project is included in Appendix N.

6.3 Infrastructure Build-up Status

The bulk of the infrastructure equipment directly associated with ongoing research projects has been received or has been ordered. The remaining infrastructure equipment has been ordered or is out on bids and should be received during the next three months.

6.4 Education and Training

Pursuant to the GCRMTC statement of work, the New Orleans Site, in conjunction with the Center, plans to undertake several education and training projects to meet the needs of the marine industry. These projects were based on the February 22-23, 1995 Workshop findings and were discussed at the May GIAB meeting.

6.4.1 Workshops

Two workshops are planned for the immediate future. In mid-October, the Center will host at the University of New Orleans a workshop entitled "Industrial Engineering Methods (Processes) on specific Applications Employed in Shipyards." This workshop will be presented as a result of an NSRP-SP-8 Panel Project.

The Second workshop co-sponsored by the Center (ERIC) will take place at UNO in early November and will deal with pollution prevention techniques.

Reports of both of these workshops will be available in the Center's quarterly report ending December 1995.

7. ORANGE SITE ACTIVITY REPORT

The Orange Site has advertised positions regionally and nationally and has extended offers to three candidates for project manager positions. One candidate has accepted to date. The site also plans to hire researchers as projects are developed. The Orange Site has continued its progress in establishing its facilities and working to fulfill its scope of work. Personnel from the Orange Site have attended the SP-9 Panel meeting in Newport News, Virginia, and initiated review of selected but unfunded SP9 and SP8 projects. In addition to following up on the collaboration with the NSRP, the Orange Site has had numerous meetings with potential users of the site.

The following narrative details the Orange Site's activities in the last quarter. A milestone chart is attached as Appendix O.

7.1 Facilities

Appendix P shows the current status of the Site's hardware and software procurements. In-kind support provided by hardware and software vendors is also shown and is currently estimated, based on discounts, at $881,000.

7.1.1 Hardware

Two Hewlett Packard 9000 series workstations and two DEC Alpha workstations were received and are currently being installed on the Orange Site network. Discussions are continuing with Intergraph regarding adding their hardware to the suite. Currently, NAVSEA is providing the site with a CAD II workstation for the purpose of data conversion to support visualization of the LPD-17 product model.

7.1.2 Software

The baseline software suite has been procured and installed as shown below:

Software Function	Software Received and Installed
Product Modeling	Auto Cad Release 13
	Pro-Engineer (Parametric)
Mechanical Simulation	ADAMS (Mechanical System Simulation)
Physics-based Simulation	ANSYS (Finite Element)
	FIDAP (Computational Fluid Dynamics
Immersive Visualization	d-Vise and dVS Toolkit (Division)
Visual Simulation	Vislab Animation and Visualization
Ship's Lines and Naval Architecture	Flagship

7.2 Statement of Work Items

7.2.1 Technology Development

7.2.1.1 Regional

A Program for Monitoring CPU Usage in a Distributed Computer System Network (in progress)

This project is underway. See the attached status report (Appendix Q).

7.2.1.2 National

Simulation of Outfitting Processes in New Ship Construction (proposed)

This was to be submitted by the end of July; however, revisions to the scope have been significant. The current revision of the proposal has been informally submitted to Avondale for review.

Simulation of Steel Assembly in New Ship Construction (proposed)

The Orange Site reviewed the revised proposal from Babcock & Wilcox (a McDermott Company) for the NSRP Project 8-94-1 entitled "Simulation Modeling of Critical Production Processes." The comments and questions were returned to Babcock & Wilcox for consideration. Among the items to be reconsidered by the proposer are the cost sharing requirements of NSRP projects. As proposed, Babcock & Wilcox failed to adhere to the NSRP guidelines which allow for reimbursement of direct costs only. The project had an estimated cost to the Site of approximately $450,000 of which only $150,000 could be considered direct costs.

7.2.2 Testing of Ships, Ship Systems, and Shipbuilding Technology Improvements

7.2.2.1 Regional

Gulf Copper Manufacturing Corporation Business Process Improvement Project (in process)

See the attached progress report (Appendix R).

7.2.2.2 National

Agile Manufacturing System Demonstration (complete)

Orincon Corporation, McDermott Shipbuilding, and Intergraph have been working on ARPA Project OCR-95-4107-U-0139 entitled "Agile Manufacturing for Shipbuilding."

The Orange Site served as a node for a major technical demonstration with the Agile Collaborative Enterprise (ACE) System featuring Orincon, ARPA, Intergraph, McDermott, GCRMTC (Orange), Reliant Steel Mills, and ACME Electrical Supply. The objective of the demonstration was to showcase the operation of virtual collaboration in a distributed environment in the area of agile manufacturing for shipbuilding. The site assisted in the execution of this complex demonstration by providing the necessary on-site technical expertise and access to its suite of software and hardware.

National Shipbuilding Network

The Orange Site has agreed to support development of the National Shipbuilding Network (NSnet) by providing Internet home pages for regional and local marine-related businesses. These businesses include shipbuilders, repairers, suppliers, service providers, and port operators. This activity is being undertaken with the assistance of the Electronic Commerce Resource Center (ECRC).

7.2.3 Education and Training of Shipbuilding Personnel

7.2.3.1 Regional

Monthly Executive Workshops (ongoing)

The Orange Site has been holding monthly meetings with local industry representatives to acquaint them with programs, services, and facilities available. The October meeting to be held at the Orange facility will be an introduction to the Internet showing examples of business presence on the World Wide Web, and requirements for the Center-sponsored Internet home page.

7.2.3.2 National

Summer Intern Program

Two summer students were recruited from the University of Michigan Department of Naval Architecture. They spent 10 weeks at the Orange site working with the staff to develop and evaluate hardware and software.

Japanese CIMS Translation Project (in process)

The draft translation was forwarded for review to The University of Michigan and members of the NSRP SP-4 Panel. The draft has been edited and is currently in revision prior to final release. See the attached progress report (Appendix S).

Sponsorship of NSRP SP-9 FY 96 Projects

Personnel from the Orange Site met with the members of the NSRP SP-9 Panel and worked out administrative details related to the FY96 projects. The Request for Proposal has been released with a deadline for proposal submission in December 1995.

In addition to the FY 96 projects, the Orange Site has been asked to fund SP9-95-3, "Two Interactive Multimedia Training Modules." During a recent meeting with the NSRP SP-9 Panel members, this project was discussed, and it was recommended that the project incorporate current technology and be made available over the Internet via NSnet. The SP-9 Panel is in the process of determining the appropriate subject areas for the training modules.

7.2.4 Marketing Resources

7.2.4.1 Regional

Texas Gulf Coast Regional Ship Repair Market Analysis (in process)

The Lloyd's Register database was obtained to support related research. See the attached progress report (Appendix T).

7.2.4.2 National

Marketing Resource Center Feasibility Study (in process)

A consultant, Dr. Howard M. Bunch, was retained to develop and perform a feasibility study for the marketing resource center. He has submitted a work plan and is proceeding. See the attached progress report (Appendix U).

7.2.5 Simulation-Based Design

7.2.5.1 Regional

Stern Factory (pending release)

McDermott Shipbuilding has approved the Orange Site's proposal for participation in the Stern Factory project.

Application of SBD to the LSQ/C Project (in development)

The Orange Site has received the CAD files for Brown & Root's design of the LSQ/C. The Site is converting the models and developing a mechanical system simulation of the proposed design to serve as a demonstration of simulation-based design and the Orange Site's capabilities.

LPD-17 Product Model Visualization (in process)

As a demonstration of immersive visualization, the Orange Site has received an immersive model of the Navy ship, LPD-17, which is currently being designed. The product model has been received from NAVSEA, and the Orange Site is currently in the process of converting it into an immersive environment. To continue this work, an Intergraph workstation and a format converter are required.

8. ACTIVITIES PLANNED FOR NEXT QUARTER

In addition to the future work described in previous paragraphs and in the individual projects in the Appendices, work is planned over the next quarter in the following areas:

1) The Center and Sites will continue to interact with the marine industry on both national and regional levels. Plans include sponsored workshops as well as continued representation at local industry forums and meetings with industry representatives and management.

2) The Orange Site will continue to develop relationships with educational institutions and businesses, both regionally and nationally, to maximize the economic benefit of the technologies available at the Orange Site. Site personnel will continue to meet with representatives of business and educational institutions to discuss partnerships in new research and educational opportunities.

3) Plans will be developed to attend the Ship Production Symposium in San Diego in February 1996.

9. SUMMARY

The GCRMTC objectives and milestones as defined by the Cooperative Agreement continue to be met in a timely fashion. The achievements of the two sites and the Center during the third quarter of 1995 were as follows:

1) Nearly all staff positions at both Sites and the Center have been filled.

2) The infrastructure buildup at both Sites and the Center — consisting of renovations of facilities and acquisition of research equipment, computer hardware and software — is nearly complete.

3) Research projects were initiated at both Sites and are now fully operational. Status reports of 15 research projects are appended. Each research project is in collaboration with shipbuilding/marine industry partners.

4) The Environmental Resources and Information Center (ERIC), collocated at the New Orleans Site, continued buildup of operations. ERIC will be a depository and resource for environmental issues of concern to the shipbuilding industries.

5) A work plan has been submitted to initiate the Marketing Resource Center Feasibility Study at the Orange Site.

6) The Orange Site served as a node for a major technical demonstration with the Agile Collaborative Enterprise.

7) The Orange Site has completed its Simulation-Based Design Facility at Orange, Texas. The Silicon Graphics workstations and considerable associated software have been purchased and are operational.

10. RECOMMENDATIONS

Based on a review of the last quarter's activities of the Center and the New Orleans and Orange Sites along with the feedback from the Program Manager and Staff, the following actions are recommended:

1) Receive and evaluate responses to the RFP issued in July, 1995. Conduct an external peer review and transmit recommendations to the Executive Director of GCRMTC. Request approval from the Government Program Manager for award of subcontracts.

2) Evaluate Concept Proposal responses to the August, 1995 solicitation. Prepare pre-proposal packages utilizing the Concept Proposals for GIAB review.

3) Continue plans for a Government/Industry Advisory Board Meeting in early December 1995.

4) Host a welding workshop at UNO in October 1995.

5) Host a meeting in October 1995 at UNO between the Government Program Manager and the New Orleans Site Researchers. This meeting will be chaired by the Executive Director of the GCRMTC.

6) Co-sponsor a Pollution Prevention Workshop at UNO in November 1995.

7) Purchase and develop suitable GCRMTC display materials including a good quality display board, illustrative photographs, and video tapes.

8) Revise and update the GCRMTC Procedures Manual.

9) Initiate visits to selected shipyards to promote the GCRMTC. This would involve the GCRMTC Executive Director, the Government Program Manager, and the GIAB Industry Representative.

10) Based on government funding delays, reassess the five-year Center milestones and budget goals.

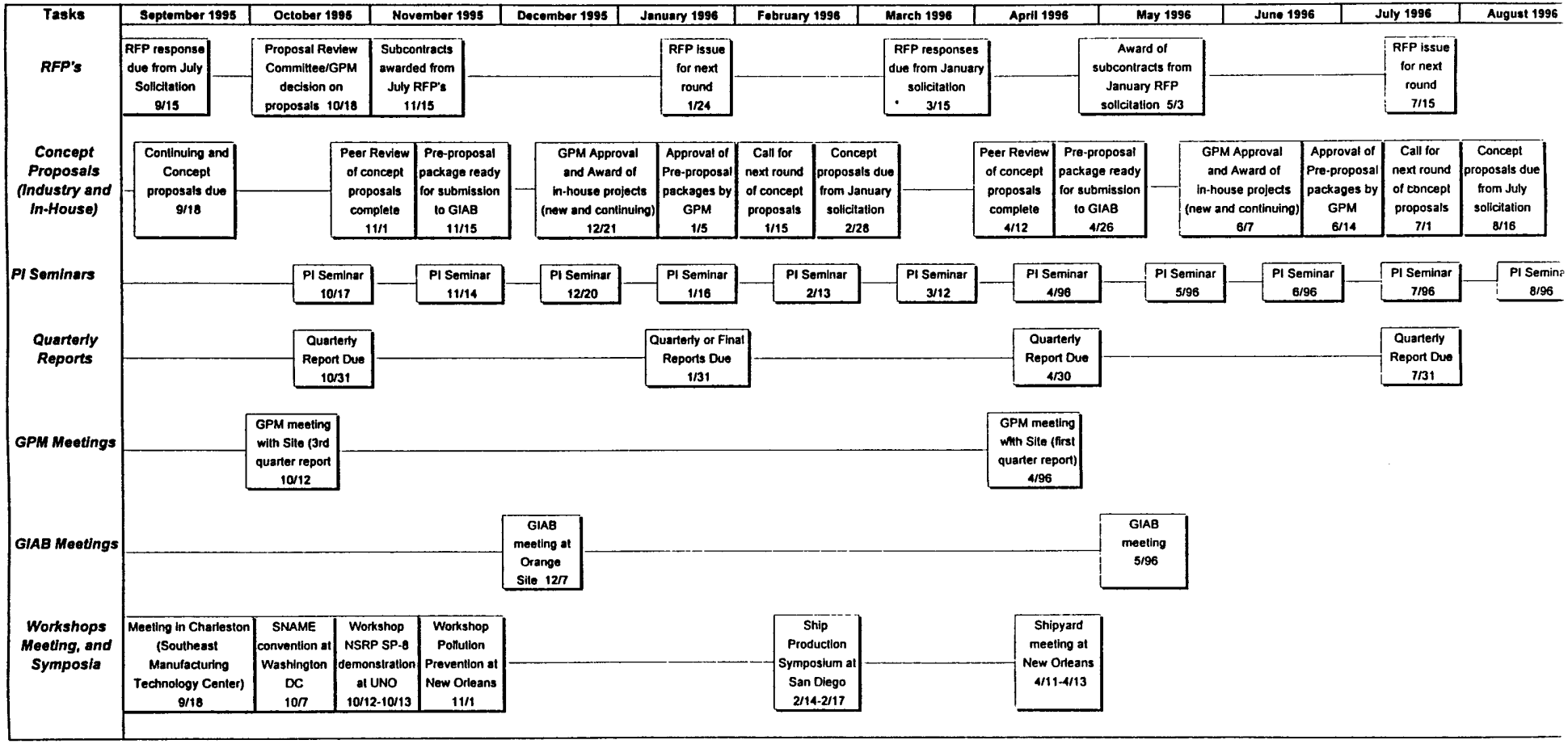
APPENDIX A

GULF COAST REGION MARITIME TECHNOLOGY CENTER

MASTER SCHEDULE

University of New Orleans
New Orleans, LA 70148

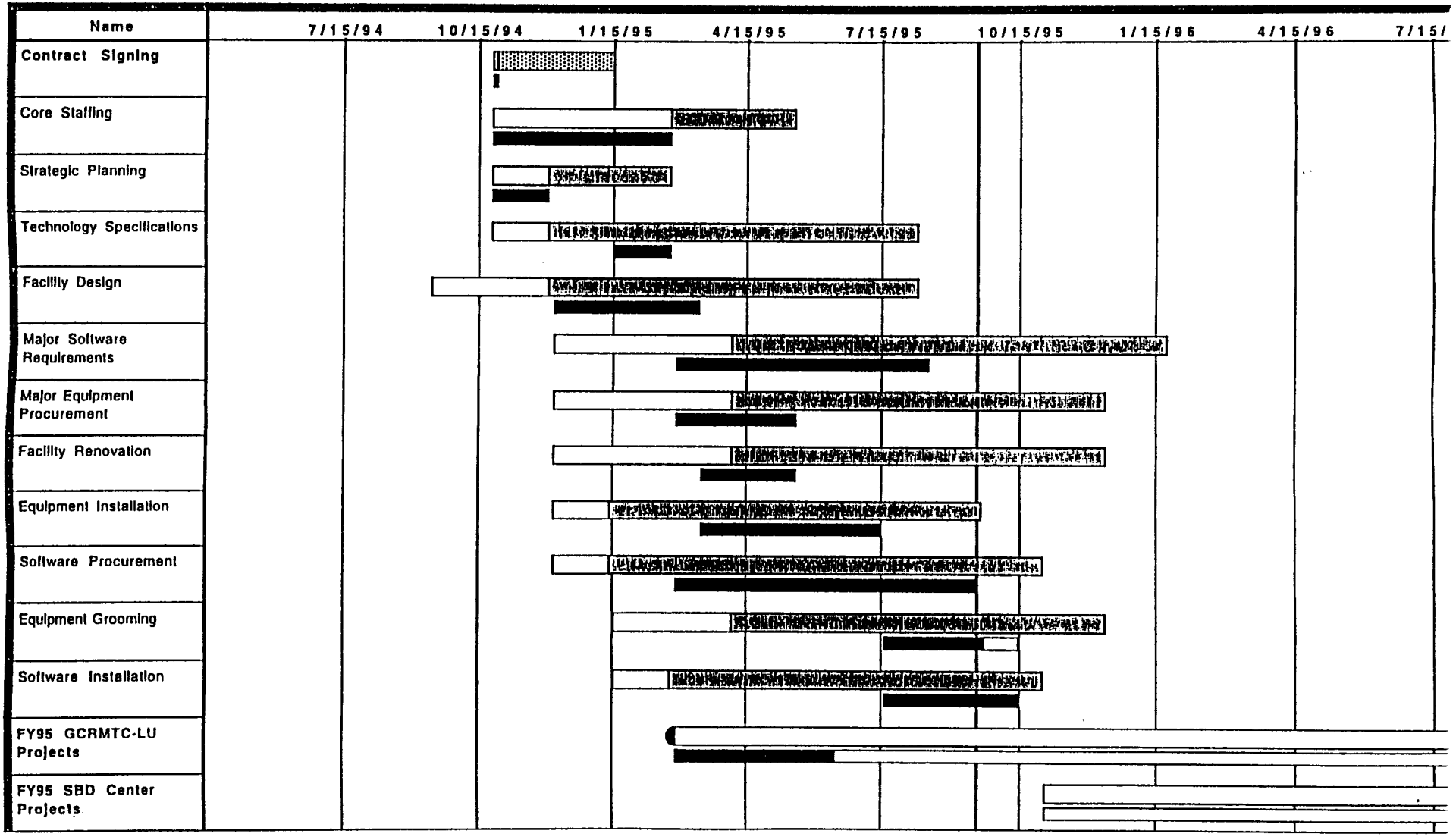
Gulf Coast Region Maritime Technology Center and New Orleans Site Master Schedule



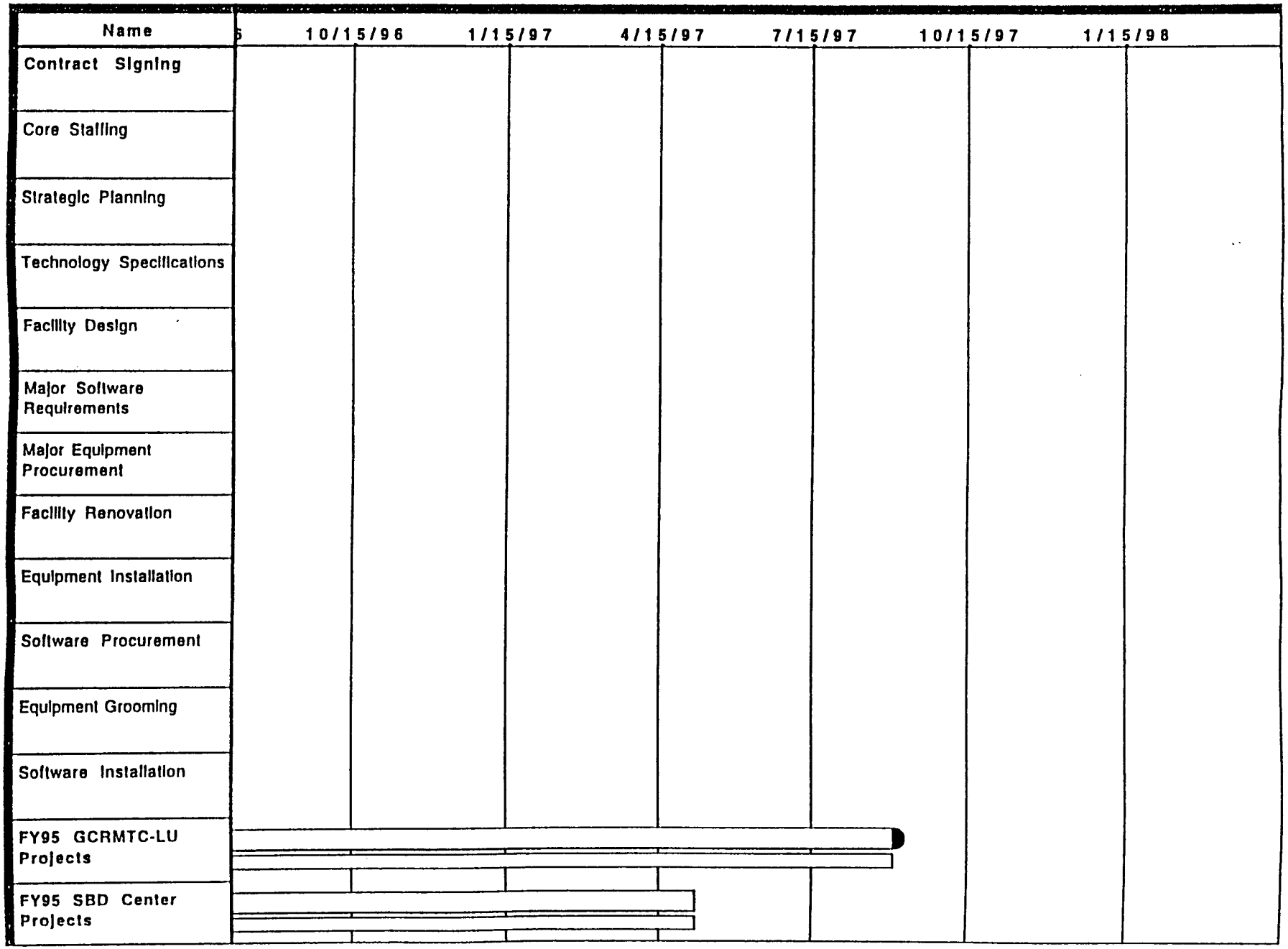
GCRMTC-Lamar University Site Program Master Schedule

Name	Earliest Start	Latest Finish	Actual Start	Actual Finish	% Done
Contract Signing	10/24/94	1/16/95	10/24/94	10/24/94	100
Core Staffing	10/24/94	5/19/95	10/24/94	2/24/95	100
Strategic Planning	10/24/94	2/24/95	10/24/94	12/2/94	100
Technology Specifications	10/24/94	8/8/95	1/15/95	2/24/95	100
Facility Design	9/12/94	8/8/95	12/5/94	3/15/95	100
Major Software	12/5/94	1/23/96	2/27/95	8/15/95	100
Major Equipment	12/5/94	12/12/95	2/27/95	5/20/95	100
Facility Renovation	12/5/94	12/12/95	3/16/95	5/20/95	100
Equipment Installation	12/5/94	9/19/95	3/16/95	7/15/95	100
Software Procurement	12/5/94	10/31/95	2/27/95	9/15/95	100
Equipment Grooming	1/16/95	12/12/95	7/17/95	10/15/95	75
Software Installation	1/16/95	10/31/95	7/17/95	10/15/95	100
FY95 GCRMTC-LU	2/27/95	9/2/97	2/27/95	9/2/97	12
FY95 SBD Center	11/1/95	5/7/97	11/1/95	5/7/97	0

GCRMTC-Lamar University Site Program Master Schedule



GCRMTC-Lamar University Site Program Master Schedule

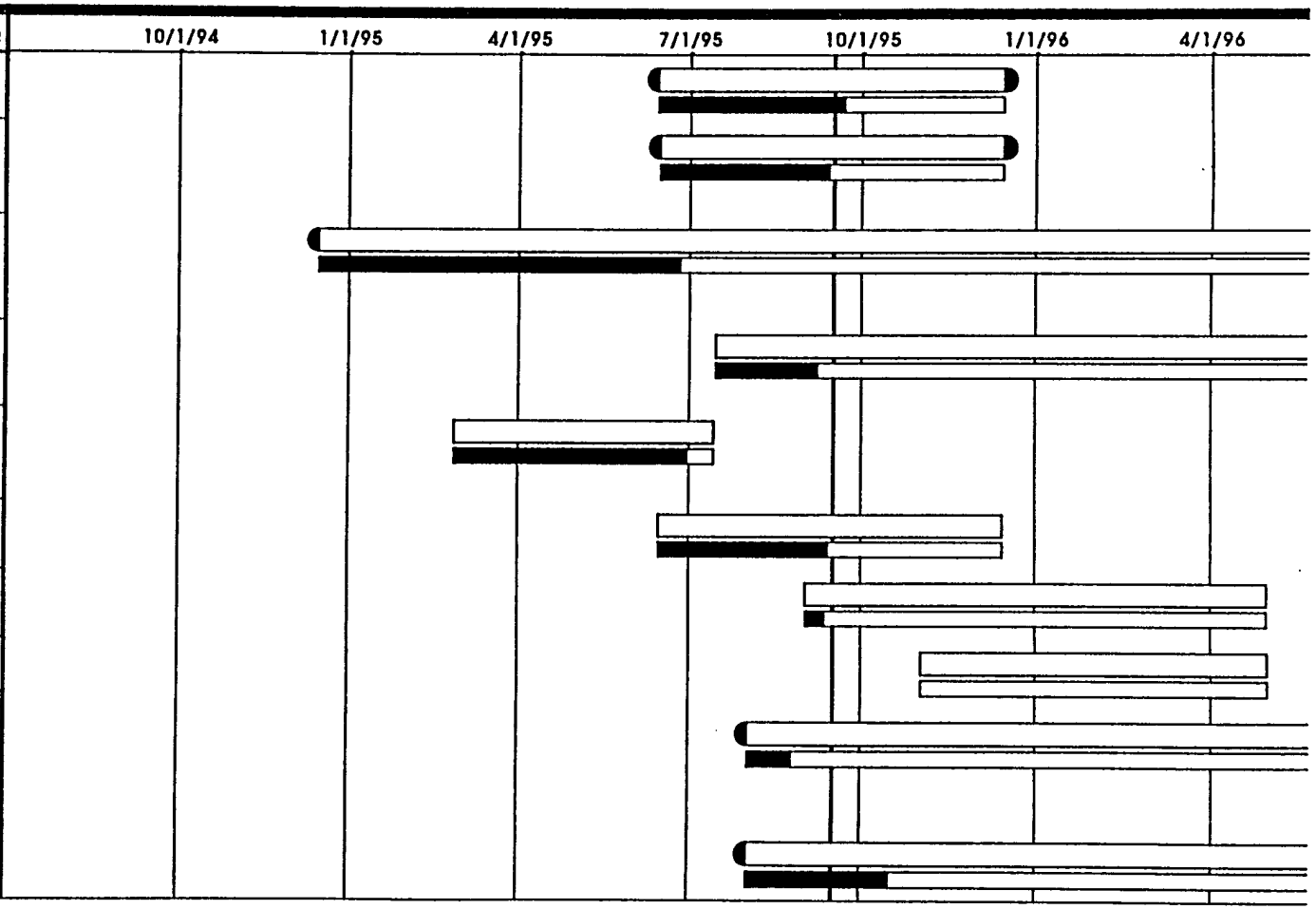


GCRMTC-Lamar University Project Master Schedule

Name	Earliest Start	Latest Finish	Actual Start	Actual Finish	% Done
Computer Billing	6/14/95	12/15/95	6/14/95	12/15/95	55
Ship Repair Business	6/15/95	12/15/95	6/15/95	12/15/95	50
Simulation of Outfitting	12/15/94	10/24/96	12/15/94	1/6/97	26
Support of National	7/15/95	7/18/96	7/15/95	7/18/96	15
Translation of Japanese	10/16/95	7/14/95	10/16/95	7/15/95	90
Regional Ship Repair	6/15/95	12/15/95	6/15/95	12/15/95	50
Marketing Resource	9/1/95	5/1/96	9/1/95	5/1/96	5
Maritech Stern Factory	11/1/95	5/1/96	11/1/95	5/1/96	0
NSRP SP-8 Project	8/1/95	4/22/97	8/1/95	4/22/97	4
Sponsorship of NSRP	8/1/95	9/2/97	8/1/95	9/2/97	10

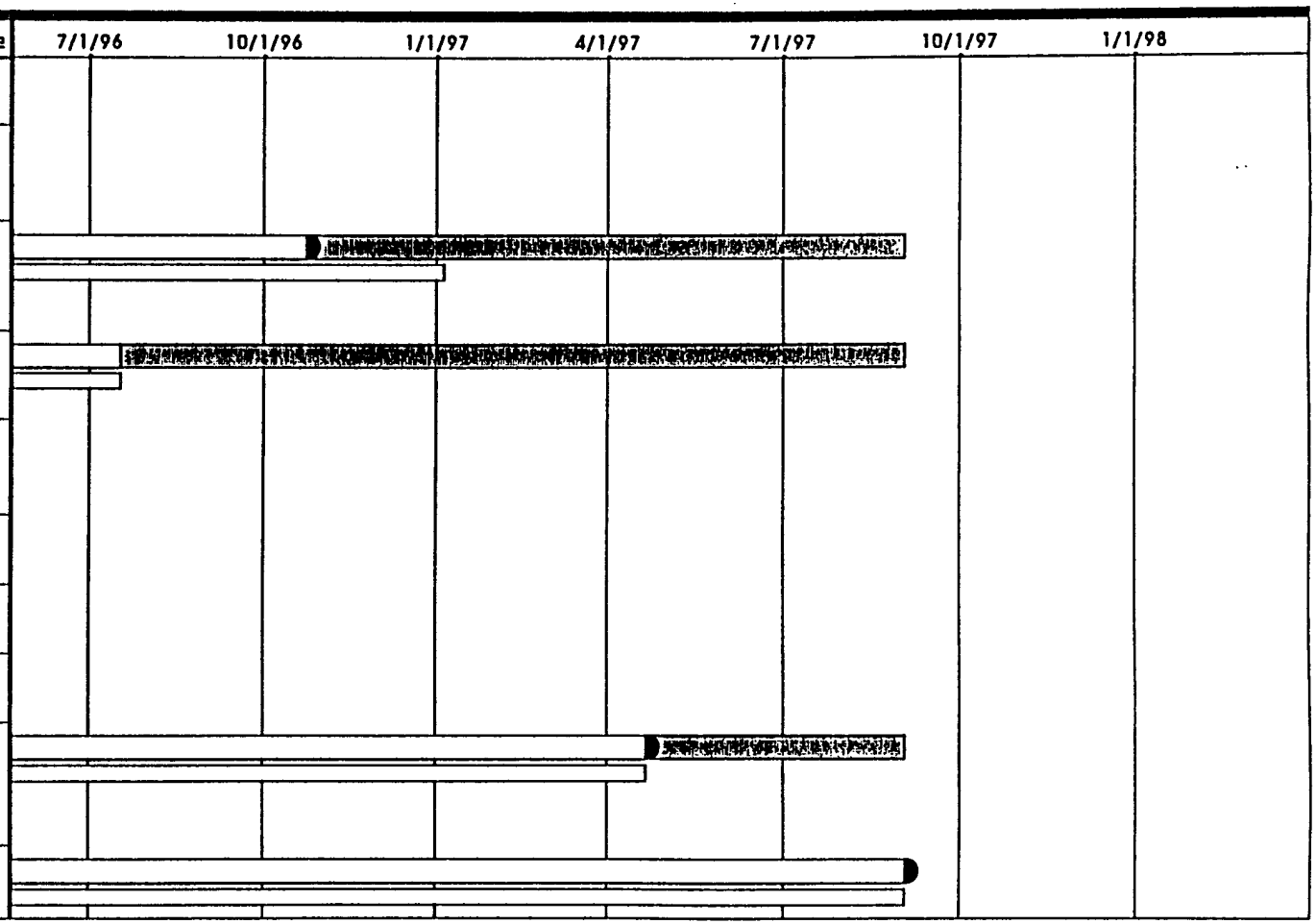
GCRMTC-Lamar University Project Master Schedule

Name	Project Type
Computer Billing Software	GCRMTC-LU In-house
Ship Repair Business Process Improvement Project	GCRMTC-LU In-house
Simulation of Outfitting Processes in New Ship Construction	GCRMTC-LU In-house
Support of National Shipbuilding Network (NSnet)	GCRMTC-LU In-house
Translation of Japanese CIM Project Report	GCRMTC-LU In-house
Regional Ship Repair Market Study	GCRMTC-LU In-house
Marketing Resource Center Feasibility Study	GCRMTC-LU In-house
Maritech Stern Factory	GCRMTC-LU In-house
NSRP SP-8 Project 8-94-1 Simulation of Critical Production Processes	Subcontract
Sponsorship of NSRP SP-9 FY96 Projects	Subcontract



GCRMTC-Lamar University Project Master Schedule

Name	Project Type
Computer Billing Software	GCRMTC-LU In-house
Ship Repair Business Process Improvement Project	GCRMTC-LU In-house
Simulation of Outfitting Processes in New Ship Construction	GCRMTC-LU In-house
Support of National Shipbuilding Network (NSnet)	GCRMTC-LU In-house
Translation of Japanese CIM Project Report	GCRMTC-LU In-house
Regional Ship Repair Market Study	GCRMTC-LU In-house
Marketing Resource Center Feasibility Study	GCRMTC-LU In-house
Maritech Stern Factory	GCRMTC-LU In-house
NSRP SP-8 Project 8-94-1 Simulation of Critical Production Processes	Subcontract
Sponsorship of NSRP SP-9 FY96 Projects	Subcontract



APPENDIX B

INEXPENSIVE NON-TOXIC PIGMENT SUBSTITUTE FOR CHROMIUM IN PRIMER FOR ALUMINUM SUBSTRATE

GCRMTC PROJECT NO. AMTC95-001C

Principal Investigator: **Alfred F. Daech**
Department of Civil and Environmental Engineering

Additional Researcher: **Kenneth L. McManis**
Department of Civil and Environmental Engineering

University of New Orleans
New Orleans, LA 70148

PROJECT SYNOPSIS: A new concept of corrosion inhibition makes it possible for various lithium compounds to offer a viable alternative to chromium.

Lithium Carbonate in solution has been shown to protect certain metals, particularly aluminum, from corrosion by reacting at the surface. SIMS (Secondary Ion Mass Spectrometer) confirms this phenomena. Sodium carbonate and potassium carbonate reactions produce a soluble product, and no alkali is detected on the surface by SIMS. Because of their high solubility and reactivity most "alkaline metal" compounds are not suitable for corrosion protection. Metallic aluminum normally provides its own corrosion protection due to its tendency to form an aluminum oxide insulator on the surface, but the matrix of hydrated aluminum oxide is penetrated by chemicals such as NaCl, acid and bases.

Scientists observed that certain aluminum-lithium alloys demonstrated some diffusion of lithium to the surface of the alloy. The lithium ion is so small that it penetrates the large interstitial spaces of the aluminum oxide layer. The aluminum - lithium alloys are stable in chemical composition at ordinary temperatures but a lithium-rich surface can be easily produced in the alloy by briefly heating to facilitate the migration.

It appears that certain lithium alloys or compounds can be incorporated into a paint vehicle or otherwise deposited on the surface of aluminum alloys to provide corrosion protection when these alloys are exposed to salt water, humidity and other corrosive environments.

The corrosion propensity of the various alloys of aluminum may be measured by electrochemical techniques. Electrochemical techniques of corrosion testing have continued to be attractive to investigators interested in corrosion. The imposition of a controlled potential via a potentiostat is a very attractive concept in terms of reaction kinetics. Furthermore, electrical currents are simple to measure and can be directly related to electrochemical reactions rates through Faraday's Law. AC techniques can be used to determine film resistivity and thickness values. A variety of electrochemical tests have been proposed and developed.

This technique will be used to screen the proposed corrosion inhibitors. In Phase II, ASTM G-3 and G-5 corrosion tests will be used to screen performances of inhibitors, selecting those which show promise to meet military specifications as coordinated with Navy.

We will be using the metals substrates representative of the Navy requirements. Concentrations of the inhibitors will be maintained where possible at a pigment volume of 35%. Final amounts may vary, but the fundamental considerations at this screening are whether or not the inhibitor is in fact passivating, and the comparative rating of each inhibitor based on electrochemical corrosion results.

Once corrosion inhibitors have been selected they will be incorporated into paints and tested to traditional panel tests such as Salt Spray B117, Acetic Acid Salt Spray B287, and other tests as itemized in the proposal and deemed necessary by Navy personnel.

Preliminary tests performed by the Principal Investigator demonstrated that aluminum-lithium pigment in an acrylic vehicle does inhibit corrosion of aluminum substrates in salt spray and humidity tests.

The objectives of this project are to up-grade the lithium pigment, optimize the pigment and formulate an essentially non-toxic paint using recent innovations.

BUDGET STATUS:

TOTAL AMOUNT BUDGETED:	$117,386
FUNDS REMAINING:	$ 44,264

ACCOMPLISHMENTS THIS PERIOD:

Note: The first year's schedule has slipped in some task areas due to the May flood and defective equipment that could not be repaired until the factory representative arrived to verify the problem.

1. Contact Suppliers by Phone

Doctor Alex Chou of Reynolds has been contacted and has agreed to send us the version of aluminum-lithium proposed for use on the space shuttle. Comalco (Australia) has supplied a sample of high lithium content alloy. Alcoa has offered to sell sheets of alloy 2090, but the price and quantity are excessive.

The Aluminum Powder Company Limited in England unofficially suggested a price of $8/# in large quantity, but for 150# minimum the price is about $40/#. We are negotiating to get smaller quantities at a better price. International Nickel, Pichonet, Kaiser, Alcan and International Light Metals have not yet agreed to participate.

2. Perform Survey of Similar Studies

The only study found in literature was that by R.G. Buchheit of Sandia and Jing Gui and M.T. Douine (University of California, Berkeley). They are working on the "Anodize" or "Irridite" approach so far as we can tell. Buchheit has sent his papers to us, and the literature study has given us published work to date by the University of California. The formation of "talc," if it occurs, is probably not the source of our corrosion resistance since no carbonate is used. The literature search is complete.

3. Study Literature

The pertinent papers from the literature survey have been received, and all but two or three of 60 are on file and have been studied. This compilation will be periodically updated but is essentially complete.

4. Order Any Other Promising Inhibitors

Many of these chemicals are on hand and will be disclosed as they are tested.

5. Prepare Screening Tests

The first screening tests have been performed on pure aluminum panels. We will look at passivation by combinations of inhibitors. 5,000 and 2,000 series were checked to look at alloying effects on the aluminum corrosion properties as related to the passivity produced by the lithium and its salts. Figure 1 illustrates that alloys 1100, 2219,5052 and 6061 were passivated.

6. Perform Rating by Electrochemistry

This task was delayed because of equipment malfunction. The machine is now repaired, and results are reported in the text. Figure 2 shows that salt (NaCl) does not passivate. Lithium Carbonate passivates. Lithium Citrate is the best.

7. Treat Pigments

We cannot treat pigments until an argon oven is functional so that we can check results. This also will be reported in the next quarter.

8. Analyze Lithium Salts & Metals

A study was made of the promising materials on hand. Corrosion inhibitors were selected. The results are encouraging. Lithium citrate looks particularly good. Since no carbonate is available in the test, the formation of "talc" does not occur. The solution is ultra-pure water with nitrogen purge. The passivity appears superior to that of lithium carbonate, but the exact compound formed at the surface has not been determined. Analyses remain to be performed.

9. General

Three significant developments resulted from the first year's investigations. First, several inhibitors in the form of lithium salts seem to show promise. Lithium citrate looks particularly good, possibly because of the three lithium atoms in the molecule and possibly because of the citrate. Lithium nitrate also looks good. Since all carbon dioxide was flushed out of the water, since certified ultra-pure water with no carbonate was used, the formation of "talcite" coating

described in U.S. Patent 5,266,356 does not seem probable with these inhibitors. It appears more likely that lithium alumnate (inert ceramic) or some other reactant or structure is probable. Investigations will continue into 1996.

In any event, the passivation was verified on aluminum alloys 1100, 2024, 2219, 5052, and 6061. The 2219 showed a unique second peak which also passivated. This may be pitting corrosion.

The second innovation is called "Nanostructural Inhibitors." The ratio of atoms on the surface to the body of a typical tiny pigment particle is about 1:10,000. If we heat aluminum lithium to 300 C, the lithium migrates to the surface. This is done under argon, and although the lithium is only 2 or 3% by weight, the surface collects about 90% lithium. This should improve the corrosion resistance of the alloy and provide surface sites for reacting citrate, etc.

Typical structures painted 20 or more years ago with chrome or lead pigments retain their color if cut, indicating that surface inhibitors may be effective and that much of the inhibitor is not consumed.

Third, since the lithium is heated in argon, the lithium tends to migrate to the surface of the aluminum-lithium alloy and properties such as fracture toughness, and weldability should be improved. This will be a separate investigation. The light weight of aluminum-lithium is desirable, but the fracture properties and welding present problems. The relocation of lithium to the surface should enhance corrosion resistance, improve fracture properties and simplify welding. The aluminum lithium now produced (and patented) by Comalco should offer much-improved properties for aluminum superstructures and hulls.

PROPOSED ACTIVITIES NEXT QUARTER

1. Obtain Vehicles

The military specifications for paints of interest will be scanned, and paint vehicles will be selected. "Euro Navy USA" will be contacted to get its participation.

2. Continuing Pigments

The fundamental goal is to find the optimum pigments. Many possibilities exist. Experimental data will be continuously gathered. A modified Taguchi statistical program will be used to optimize inhibitors selected thus far.

3. Surface Analyses

Surfaces will be analyzed to verify the results. Various reactants will be added to the lithium at the surface.

4. Military Specifications

Military specifications related to the project will be obtained, and the applicability of the research product will be appraised. A list of possible specifications will be compiled.

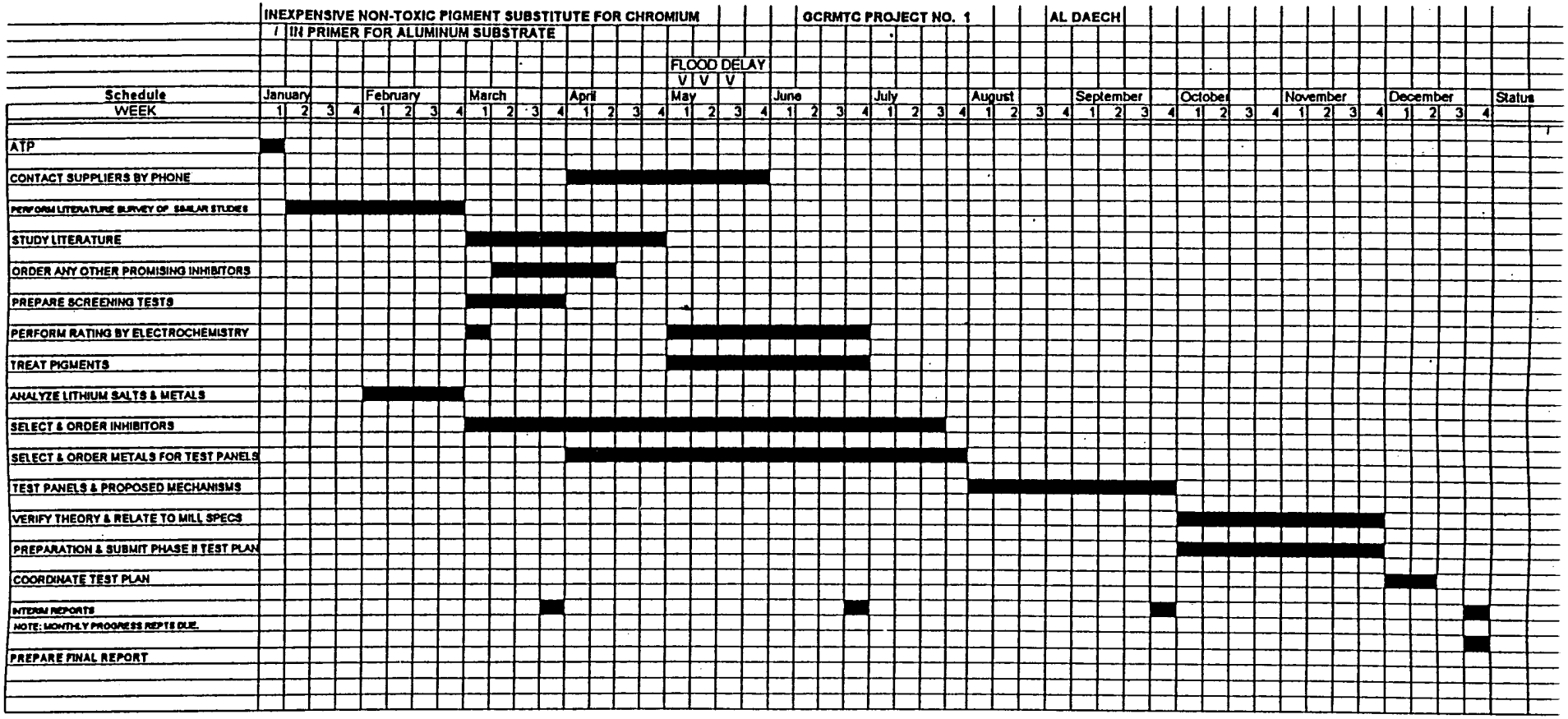
5. Reports

A final report, based on this first year of effort, will be prepared.

COLLABORATIVE EFFORTS:	THIS QTR	YTD
$ VALUES OF SERVICES FROM INDUSTRY:		
IN KIND SERVICES:	0	0
ACTUAL FUNDS:	0	0
$ VALUES OF SERVICES FROM GOVERNMENT:		
IN KIND SERVICES:	0	0
ACTUAL FUNDS:	$24,561	$73,122
# OF SIGNIFICANT CONTACTS:		
INDUSTRY:	1	10
ACADEMIC:	2	4
GOVERNMENT:	2	3

COMMENTS:

EURONAVY USA has committed to testing of coatings containing the pigments. These will not be available until December 1995 through March 1996.


INEXPENSIVE NON-TOXIC PIGMENT SUBSTITUTE FOR CHROMIUM
/ IN PRIMER FOR ALUMINUM SUBSTRATE
GCRMTC PROJECT NO. 1
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ATP
CONTACT SUPPLIERS BY PHONE
PERFORM LITERATURE SURVEY OF SIMILAR STUDIES
STUDY LITERATURE
ORDER ANY OTHER PROMISING INHIBITORS
PREPARE SCREENING TESTS
PERFORM RATING BY ELECTROCHEMISTRY
TREAT PIGMENTS
ANALYZE LITHIUM SALTS & METALS
SELECT & ORDER INHIBITORS
SELECT & ORDER METALS FOR TEST PANELS
TEST PANELS & PROPOSED MECHANISMS
VERIFY THEORY & RELATE TO MIL SPECS
PREPARATION & SUBMIT PHASE II TEST PLAN
COORDINATE TEST PLAN
INTERIM REPORTS
NOTE: MONTHLY PROGRESS REPTS DUE.
PREPARE FINAL REPORT

APPENDIX C

INTEGRATED ENVIRONMENTAL MANAGEMENT PLAN FOR SHIPBUILDING FACILITIES

GCRMTC PROJECT NO. AMTC95-008C

Principal Investigator: **Bhaskar Kura**
Department of Civil & Environmental Engineering

University of New Orleans
New Orleans, LA 70148

PROJECT SYNOPSIS: The project is aimed at developing an integrated environmental management plan for shipbuilding facilities that includes source reduction (waste minimization at the source), recycling, treatment, and disposal. To achieve the research objectives, Avondale Shipyard will be closely studied with data collection from other sources on environmental activities that are not common to Avondale. The project duration is three years, with completion reports at the end of each year. The final product will contain two reports, a specific Environmental Management Plan (EMP) report to serve Avondale and a generic EMP report to serve the shipbuilding industry in general.

The main components of the study are process review, identification of sources of pollution, quantification of pollutants (in solid, water and air streams), impact evaluation, review recycling/ treatment alternatives, study disposal alternatives, and regulatory compliance. The first year activities include a study of sources of pollution, emission quantification and some progress on characterization of waste streams, and a review of current pollution management practices.

BUDGET STATUS:

TOTAL AMOUNT BUDGETED:	$ 159,380
FUNDS REMAINING:	$ 124,380

ACCOMPLISHMENTS THIS PERIOD:

NOTE: This project received its funding approval in the beginning of June 1995, rather than the usual start date of January. Major accomplishments during this period are presented below:

1. Organization of Research Team/Personnel and Office Setup for Students' Team

Faculty: Dr. Enrique La Motta, Associate Professor of Civil & Environmental Engineering, has agreed to work on the project. He will be working at a 20% effort level on the project during Fall 1995 and Spring 1996. He has expertise in municipal and industrial wastewater treatment with specialization in anaerobic treatment. The focus of his research will be to assess the various sources of wastewater, review the current wastewater treatment practices and characterize the wastewater streams, and quantify the pollutants discharged through wastewater in shipyard environment.

Graduate Students: In addition to the one student worker selected in June, a total of four graduate students were appointed to work on the project. Two students were appointed on full-time graduate assistantship and two on part-time graduate assistantship. Students' background and work distribution in the project are as follows:

a. Mr. Raghuram Tadimalla: He received his B.S. degree in engineering from Jawaharlal Nehru Technological University, Hyderabad, India. He passed B.S. in Civil Engineering in first class with distinction. He is pursuing his M.S. in Civil & Environmental Engineering specialization. Currently, he is working on air pollution associated with paints in shipyards, VOC emissions, applicable regulations, and emission reduction options. He plans to work on "VOC Emissions from Shipyards" for his M.S. thesis.

b. Mr. Mallik Yalaka: He received his B.S. in Civil Engineering from Osmania University. He passed B.S. in first class with distinction. He is pursuing his M.S. in Civil & Environmental Engineering specialization. Currently, he is working on wastewater treatment sources, characterization, and treatment options. He plans to work on "Wastewater Treatment Options for Shipyards" for his M.S. thesis.

c. Mr. Azeemuddin Khaja: He received his B.S. in Civil Engineering from Osmania University. He passed B.S. in first class. He is pursuing his M.S. in Civil & Environmental Engineering. Currently, he is working on shipyard processes and environmental impact assessment of various processes. He plans to work on a topic that relates to shipyards and environmental engineering curriculum.

d. Mr. Satya Dwivedula: He received his B.S. in Physics and M.S. (Technology) in Geophysics from Andhra University, Vizag, India. He entered UNO as a graduate student in the department of Geo-Physics and later moved to the College of Engineering. He is pursuing an M.S. in Civil & Environmental Engineering. He is currently working on PM10 emissions inventory in connection with blasting operations in shipyards. He plans to work on PM10 emission factor evaluation in the context of blasting operations in shipyards for his thesis.

2. Field Visits to Avondale Shipyard

Five field visits were made to the Avondale Shipyard during the last quarter (July 25, 1995; August 1, 1995; August 17, 1995; September 14, 1995; and September 18, 1995). The visits were conducted mainly to understand the facility and various processes with an environmental perspective. Also, the following sub-tasks have been completed:

Preliminary understanding of the sources of air pollution, wastewater and solid/hazardous wastes
Preliminary understanding of the regulatory requirements of Avondale Shipyard
Preliminary understanding of the current management practices

3. Identification and Procurement of Related Technical Publications

Several documents have been obtained for the project team from EPA, NTIS, Government Institutes Inc., Avondale and several other sources. The documents cover areas such as emission factors, VOC emissions/controls, particulate emissions/controls for abrasive blasting, etc.

4. Process Description and Preparation of Flow Chart

The process description for Avondale Shipyard is in a completion stage. This will be continuously updated as more information is available.

5. Waste Surveys at Avondale

Waste surveys were initiated during this quarter. A questionnaire was prepared and sent to Avondale Shipyard for waste data collection from various shops such as paint shops, welding shops, machine shops, insulation departments, blasting shops etc. Avondale's environmental department is coordinating in collecting this data. Data will be compiled as it is collected.

6. Conference Presentations

The research team attended the International Conference on Technologies for Marine Environment Preservation held in Tokyo, Japan. The team presented three papers dealing with wastewater treatment, in-situ bioremediation of contaminated soils, and the GCRMTC's environmental research efforts (ERIC, Integrated EMP, Nontoxic pigment substitute for chromium). Also, a member of the team chaired a technical session on bioremediation.

7. Participation in Welding Studies - NAVSEA Task Group

A participant of the team served as UNO member of the Task Group organized by NAVSEA to evaluate the impact of OSHA's proposed airborne Cr(VI) regulations on maritime industry. Specific tasks handled were reviewing the similar standards in other countries and evaluating the impact of regulations on commercial shipbuilding. Several shipyards in Louisiana and shipyards elsewhere were contacted to evaluate the impact on commercial shipbuilding facilities. A draft report is being compiled by the Task Group and will be submitted to OSHA for consideration in standards development.

PROPOSED ACTIVITIES NEXT PERIOD:

1. Compile data sheets of waste surveys as furnished by Avondale. Conduct follow up meetings with the shop supervisors to better understand the waste streams, current management practices, and treatment options.

2. Complete the process flow chart and initiate preparation of pollutant emission chart for shipyard operations.

3. Continue working on quantification of the pollutants from various processes in shipyard environment.

4. Plan and work on characterization of waste streams in shipyards. Purchase the air quality analyzer (VOC Analyzer) after further review of the information from suppliers and regulatory personnel.

5. Continue to review and analyze the current waste management practices in shipyards.

COLLABORATIVE EFFORTS	THIS QTR	YTD
$ VALUES OF SERVICES FROM INDUSTRY:		
IN KIND SERVICES:	10,000[a]	10,000
ACTUAL FUNDS:		
$ VALUES OF SERVICES FROM GOVERNMENT:		
IN KIND SERVICES:		
ACTUAL FUNDS:		
# OF SIGNIFICANT CONTACTS:		
INDUSTRY:	20[b]	20
ACADEMIC:	2[c]	2
GOVERNMENT:	4[d]	4

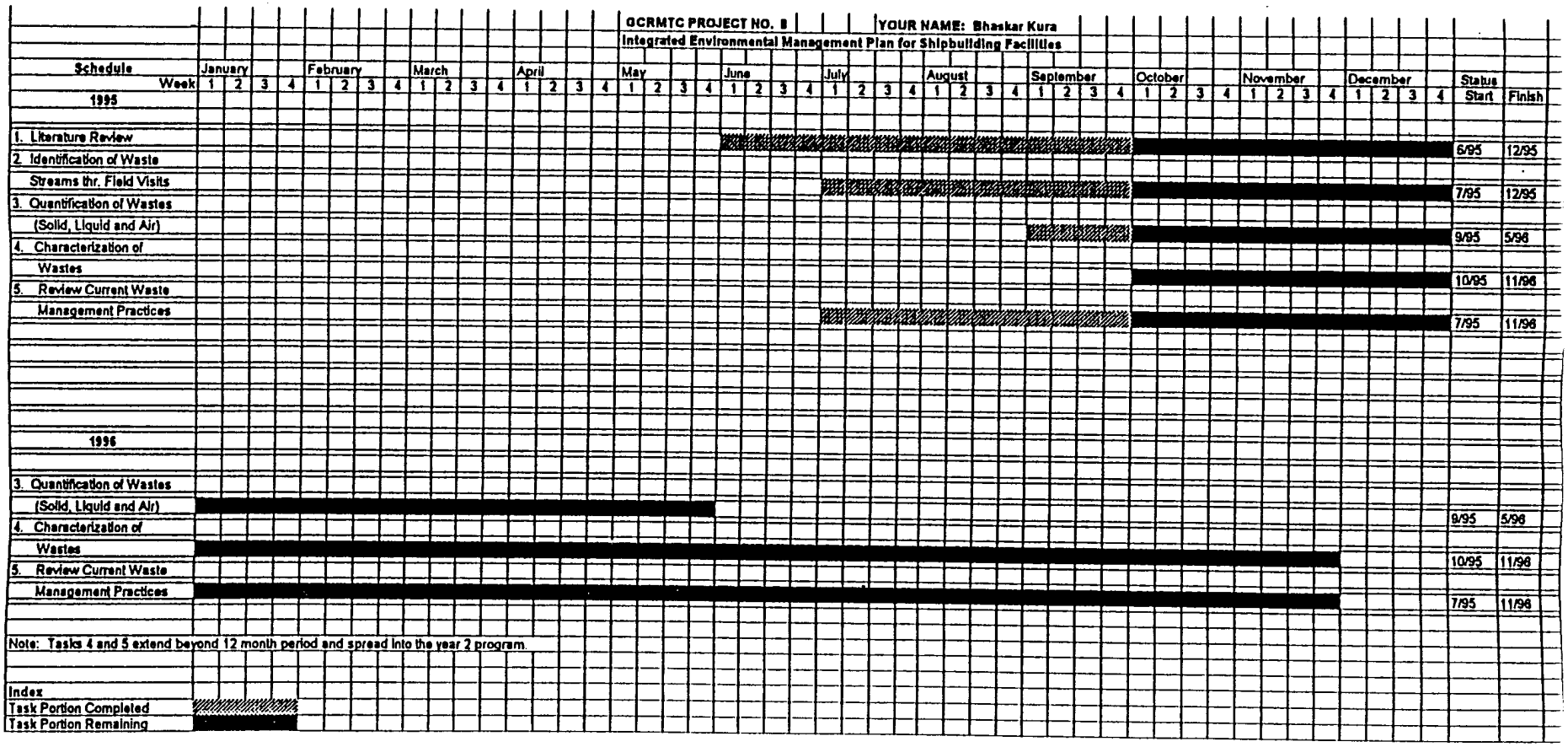
COMMENTS:

a) Includes the cost of the man-hours by Avondale staff during field visits, number of hours spent by Avondale staff in providing information, cost of photocopies provided, etc. A total of $15,000 accounted toward one man-month time of Avondale personnel and an amount of $300.00 toward the cost of photocopies provided.

b) Includes personnel at Avondale, NASSCO, NSRP-SP1, NAVSEA Task Group members such as those from CTC, NJC, Newport News, Electric Boat, etc.

c) Dr. Benny Freeman of North Carolina State University. He is working on novel membranes for VOC reductions. Another significant contact is Dr. T. Higashihara of National Institute of Bioscience and Human Technology, Ministry of International Trade and Industry, Japan. He is working on hydrocarbon degrading bacteria.

d) Personnel at DEQ office in Louisiana.


GCRMTC PROJECT NO. 8
YOUR NAME: Bhaskar Kura
Integrated Environmental Management Plan for Shipbuilding Facilities
Schedule
Week
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December
Status
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Finish
1995
1. Literature Review 6/95 12/95
2. Identification of Waste Streams thr. Field Visits 7/95 12/95
3. Quantification of Wastes (Solid, Liquid and Air) 9/95 5/96
4. Characterization of Wastes 10/95 11/96
5. Review Current Waste Management Practices 7/95 11/96
1996
3. Quantification of Wastes (Solid, Liquid and Air) 9/95 5/96
4. Characterization of Wastes 10/95 11/96
5. Review Current Waste Management Practices 7/95 11/96
Note: Tasks 4 and 5 extend beyond 12 month period and spread into the year 2 program.
Index
Task Portion Completed
Task Portion Remaining

APPENDIX D

DEVELOPMENT OF HIGH SPEED MARINE VEHICLE DESIGN DATABASE

GCRMTC PROJECT NO. 95-010C

Principal Investigator: **Robert Latorre**
Naval Architecture and Marine Engineering

Additional Researchers: **Paul Herrington**
Department of Mechanical Engineering

Michael Folse
Department of Civil and Environmental Engineering

Marcio Vasconcellos
Naval Architecture and Marine Engineering

University of New Orleans
New Orleans, LA 70148

PROJECT SYNOPSIS: This project addresses the lack of necessary data for selecting an efficient and economically priced high speed marine craft. The project emphasizes the development of required design standards and database methodology for systematic studies focused on the design of high speed marine transport craft. Presently these craft are being developed in northern Europe and the Pacific Rim countries. With the weakening of the US dollar, there is a developing market niche for US shipyards to competitively market these craft worldwide. The project also includes design and procurement of unique ship structures testing equipment required to test designs based on advanced lightweight materials.

BUDGET STATUS:

TOTAL AMOUNT BUDGETED:	$495,853
FUNDS REMAINING:	$120,807

ACCOMPLISHMENTS THIS PERIOD:

Task I – Survey of state of the art:

1. Completion of technical paper for November 1995 meeting of RINA.
2. Initial draft of SNAME paper completed.

Task II – Domestic/Overseas shipyard visits:

1. Domestic shipyard meetings with Swiftships (Morgan City, LA).

Task III a). – Catamaran design rules:

1. Dr. Latorre appointed to ABS Draft Rule Task Group for Catamaran/Multi-hull/SES/Hydrofoil Ship Structures. Rule guide scheduled for January 1996.
2. Catamaran loading calculations in progress.

Task III b). – Proposal development:

1. Completed, awaiting MARITECH response.

Task IV – Development of CIM strategy for proposed ship:

1. Coordinate with Swiftships (Shipyard 21 Project) on development of computer integrated manufacture of catamaran hull structure.

Task V a). – Tow tank testing:

1. Manufacture of models C1 and C2 consolidated into variable geometry model B. Model B is shown in Figure 1. This model will be used to evaluate design rules regarding catamaran separation distance and hull inclinations.

Task V b). – Preliminary structures testing:

1. Contract awarded to Scientific Marine Services of Escondido CA, for the structural test system.
2. Donation of large load/stroke hydraulic system from Swiftships for destructive testing of hull sections.
3. Preliminary design of catamaran structural sections I and II begun with Swiftships (Figures 2 and 3). Structural test scheduled for December, 1995.

PROPOSED ACTIVITIES NEXT PERIOD:

Task I – Survey of state of the art:

1. Compile state of the art survey into a formal report.

Task II – Domestic/Overseas shipyard visits:

1. Completed, travel reports submitted.

Task III . – Catamaran design rules:

1. Completed with ABS Draft Rule Task Group report scheduled for January 1996.

Task IV – Development of CIM strategy for proposed ship:

1. Continue coordination with Swiftships (Shipyard 21 Project) on development of computer integrated manufacture of aluminum catamaran hull structure.

Task V a). – Tow tank testing:

1. Completion of resistance/motion tests and analyses of test data.

Task V b). – Preliminary structures testing:

1. Completion of aluminum structural components by Swiftships.
2. Delivery and installation of ship structures test system.
3. Test of aluminum ship structure in test frame.

Task VI – Workshop and final report:

1. Workshop scheduled as part of SNAME Gulf Section meeting.
2. Develop final report.

COLLABORATIVE EFFORTS:	This Qtr.	YTD
$ VALUES OF SERVICES FROM INDUSTRY:		
IN KIND SERVICES:	$80,000	$80,000
ACTUAL FUNDS:		
$ VALUES OF SERVICES FROM GOVERNMENT:		
IN KIND SERVICES:	–	–
ACTUAL FUNDS:		
# OF SIGNIFICANT CONTACTS:		
INDUSTRY:	3	11
ACADEMIC:	–	3
GOVERNMENT:	–	4

COMMENTS:

$ VALUES OF SERVICES FROM INDUSTRY:

Swiftships, Inc., has agreed to materially participate in this project by contributing the following:

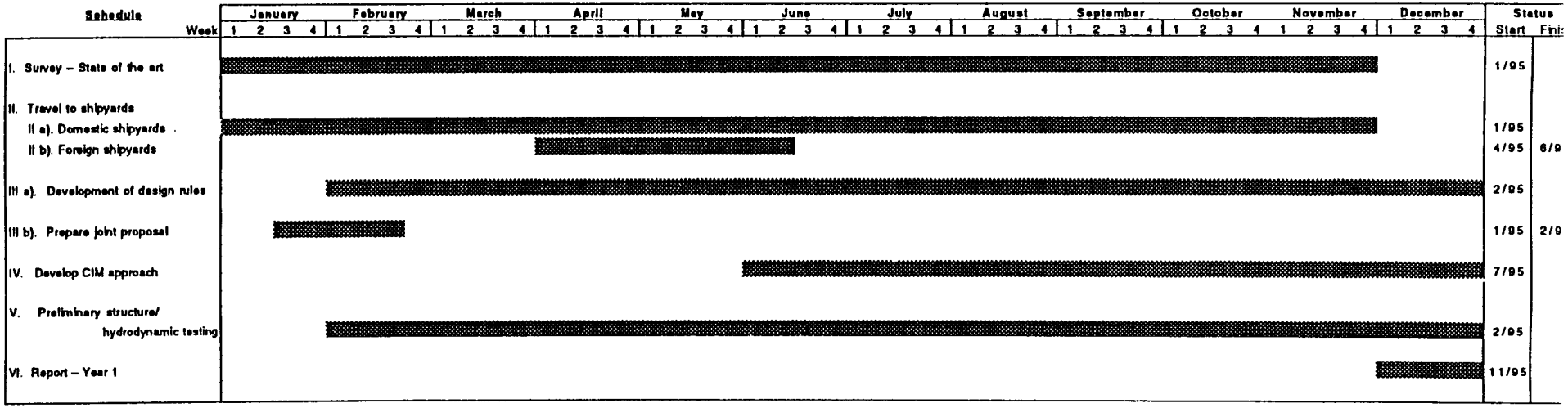
1. Participate in the catamaran structure design/analysis. (Estimated value = $5,000)
2. Deliver two structural prototypes to be tested in the ship structures test system. (Estimated value = $50,000)
3. Contribute two large actuators for high force testing. (Estimated value = $25,000)

This participation represents an in-kind match of materials and technical labor valued in the range of $75,000 to $90,000.

NUMBER OF SIGNIFICANT CONTACTS:

Industry contacts made include ABS, Swiftships, Trinity Marine, Gladden & Hearn, and Bath Iron Works. Academic contacts were established with Lehigh University, while government contacts include personnel at the David Taylor Research Center.

Development of High Speed Marine Vehicle Design Database



APPENDIX E

APPLICATIONS OF INTEGRATED OPTICAL FIBER SENSOR SYSTEMS IN SHIPBUILDING AND SHIPBOARD MONITORING

GCRMTC PROJECT NO. ATMC95-014C

Principal Investigator: **Shing Lee**

Department of Electrical Engineering

Additional Researcher: **Rasheed M. A. Azzam**

Department of Electrical Engineering

University of New Orleans

New Orleans, LA 70148

PROJECT SYNOPSIS: We propose a novel fiber-optic-sensor system based on in-line photopolarimetric measurements using D-shape fibers to address the performance and cost issues. The system is compact, sensitive, and can be multiplexed throughout the ship to provide hazard warning, pollution monitoring, processing monitoring, etc. With the use of the D-shape fiber, the sensor head is integrated to improve the compactness and reliability. This work is to investigate the applicability of shipboard monitoring using such a fiber optic system.

BUDGET STATUS:

TOTAL AMOUNT BUDGETED:	$192,039
FUNDS REMAINING:	$67,919

ACCOMPLISHMENTS THIS PERIOD:

1. The fiber twisting effects were studied using the HP Polarization Analyzer. The states of polarization were very sensitive to the twisting and other effects. Because of the high sensitivity, it is very difficult to get experimental and theoretical agreements for long fibers. Therefore, such fibers are more suitable for point sensor applications but not for long distance sensor network systems. Liquid and gas sensors are being developed using this scheme.

2. The distance between the flat-surface of a D-fiber and its cores is a very important parameter in the fiber sensor performance. It can be obtained using HF etching with relative ease. However, monitoring the distances can be difficult. A technique has been developed to monitor the etching process by looking at the evolution in polarization ellipticity using the HP spectrum analyzer and the polarization controller. The process of perfecting this method continues.

3. Preliminary results were presented at the Optical Society Annual meeting in Portland. Contacts were established with a number of researchers and companies.

4. Two simpler ways to make the polarimeter are being developed. The first one is to use a 1X5 commercial fiber directional-coupler. Because the fibers endure some unknown twisting inside the directional coupler, a special calibration technique has been devised to account for such effects. The other approach is to use two liquid crystal retarders and a polarization analyzer. Both methods look promising, and a prototype is being developed of both detection schemes.

5. One of our graduate research assistants, Mr. Dean Rader, graduated during the summer, and took a position with Bellcore. However, three highly qualified new graduate assistants will continue to work on this project. Further, a group of senior electrical engineering students currently participate in this project and receive design elective credits to fulfill their graduation requirements.

6. Collaboration has been established with Optical Fiber Technology Center, University of Sydney, Australia. They are developing dual core fibers which is very suitable for fiber sensing applications. They will supply custom made dual core fibers for our strain and temperature sensors.

7. Spatial and wavelength division multiplexers have been studied for shipboard fiber sensor networks. A new type of sensor network has been designed using a combination of spatial and wavelength division techniques using fiber gratings. Each fiber grating reflects a narrow spectrum of light. The environmental effects on each grating can be detected in the spectral shift of reflection. By using a white light source, many gratings can be put in series; and the reflection spectra can be detected using a linear detector array. Applying spatial division principle, hundreds of thousands of sensors in a fiber bundle can be networked into a single detection system.

PROPOSED ACTIVITIES NEXT PERIOD:

1. The main purpose of this project is to develop a high capacity fiber optic sensor system for shipborne sensing. The new design sensor system is very promising. The laboratory to build and test this sensor system will be set up as soon as possible.

2. Continue to make the polarimetric detection units and sensor heads.

3. Make temperature sensor prototypes using polarization maintaining-directional couplers and dual core fibers.

4. A novel current sensor is proposed by our undergraduate project students. They will build such a sensor before the end of the year.

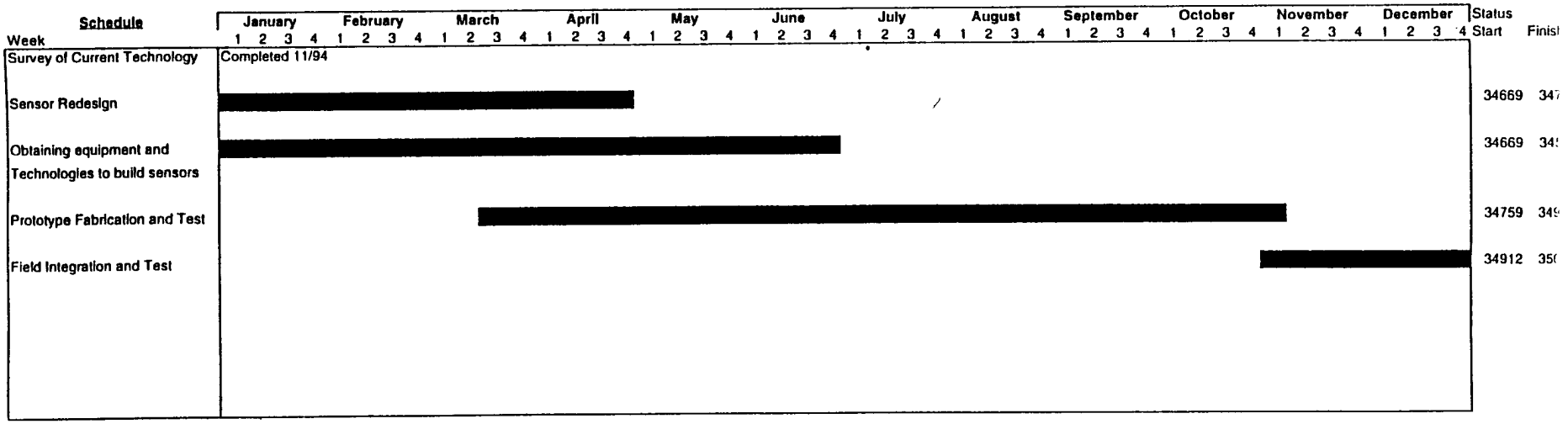
COLLABORATIVE EFFORTS:	THIS QRT	YTD
$ VALUES OF SERVICES FROM INDUSTRY:	$1,000	$1,000
INKIND SERVICES:	$500	$500
ACTUAL FUNDS:		
$VALUES OF SERVICES FROM GOVERNMENT:		
IN KIND SERVICES:		
ACTUAL FUNDS:		

OF SIGNIFICANT CONTACTS:

INDUSTRY: Ingalls Shipyards, Optical Fiber Technology Center (Australia), 3M, United Technology, TANO, Ocean Optics, Blue Road Research, McDermott, Oz Optics, and Wave Optics.

ACADEMIC: University of Sydney, University of South Hampton.

Project #14 APPLICATIONS OF INTEGRATED OPTICAL FIBER SENSOR SYSTEMS IN SHIPBUILDING AND SHIPBOARD MONITORING



APPENDIX F

SHIPBOARD SENSORS

GCRMTC PROJECT NO. AMTC95-016C

Principal Investigator: **Russell E. Trahan, Jr.**
Department of Electrical Engineering

Co-Principal Investigator: **Paul Chirlian**
Department of Electrical Engineering

University of New Orleans
New Orleans, LA 70148

PROJECT SYNOPSIS:

The main thrust of the first phase of this project is:

Task 1: survey of current technology. This survey consists of a reexamination of the present US Navy requirements for sensors aboard ships and also a survey of commercial vessel requirements. This task is complete.

Task 2: Sensor redesign is nearly completed.

Task 3: Design of data acquisition system is nearly completed. Parts are on order for construction of the system.

BUDGET STATUS:

TOTAL AMOUNT BUDGETED: $256,281.00

FUNDS REMAINING: $30,264.35

ACCOMPLISHMENTS THIS PERIOD:

1. Test plans for testing the smoke sensor and liquid level point sensor have been completed. The test plan for the temperature sensor is awaiting finalized sensor design and delivery of an environmental chamber.

2. An optical smoke sensor prototype has been fabricated and tested in the smoke chamber. Numerous tests have been completed on the breadboard model of the smoke sensor. The results of the tests on this hybrid optical/electronic system have been excellent. Smoke obscuration of as little as 0.5% for white smoke and 1.4% for black smoke has been detected. This sensitivity is superior to that of all the optical models previously built for the Navy. However, the cost of the new model is envisioned to be less than 10% of the Navy unit. An investigation of the use of light scattering in a purely optical device has been initiated.

3. The completion of the optical/electrical power conversion for the smoke sensor and its final testing is awaiting receipt of components. The power conversion module has been on order for several months. Inquiries have been made to purchasing, but an arrival date has not been determined.

4. The design of the temperature sensor based on wavelength discrimination using multimode fiber is virtually complete. Some simulation modeling results are still being generated. The current design is completely new and simulations thus far indicate superb results. This design is entirely new and should be patentable. Our previous candidate design used wavelength division multiplexers to divide the light in the fiber along two paths; the new design uses a modulation scheme with electronic filtering to divide the light signals. The latter method is much less expensive than the former.

5. Discussions with an identified fabricator for temperature sensor are still in progress. The actual fabrication is awaiting completion of the design details.

6. Tests have been made on the liquid level detector and no problems have been encountered.

7. System assembly is progressing slowly as all system level components (couplers, connectors, multiplexers, mounts, etc.,) arrive sporadically.

8. System level processing/data collection software generation has been initiated. The software packages required for the project have been purchased. Final algorithms require completed characterization data.

PROPOSED ACTIVITIES NEXT PERIOD:

1. Complete tests of hybrid optical/electronic smoke sensor. Build prototype unit with fabricated PC board.

2. Complete investigation of purely optical smoke sensor based on scattering.

3. Build enclosure for liquid level sensor and complete fabrication of liquid level system.

4. Fabricate temperature sensor based on new design. Test unit in environmental chamber.

5. Complete software for sensor data collection and processing.

6. Contact Ingalls Shipbuilding to install sensors on ship for testing.

7. Generate final report for Phase I of project.

COLLABORATIVE EFFORTS:	THIS QTR	YTD
$ VALUES OF SERVICES FROM INDUSTRY:		
IN KIND SERVICES:		$5,000
ACTUAL FUNDS:		0
$ VALUES OF SERVICES FROM GOVERNMENT:		
IN KIND SERVICES:		0
ACTUAL FUNDS:		0

OF SIGNIFICANT CONTACTS:

INDUSTRY: Bill Duke, Litton Data Systems
Ray Johnston/Stan Owen, Ingalls Shipbuilding
John Cognovich, EMI

ACADEMIC: Dr. Shing Lee, Department of Electrical Engineering, UNO

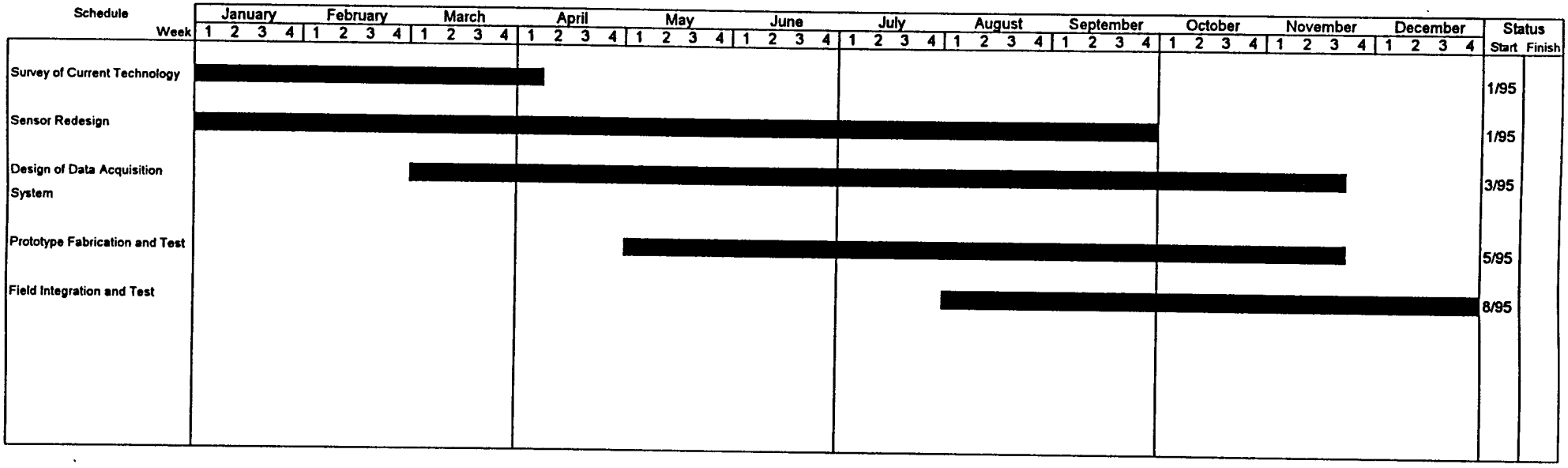
GOVERNMENT: Carl Jacobsen, NAVSEA

COMMENTS (to amplify, explain, or add to the above)

The In-Kind services were provided by Ingalls Shipbuilding. Ray Johnston provided us with a complete sensor survey for US Navy ships. This survey was to be done as part of this project. Our best estimate is that the survey cost was at least $5,000.

Shipboard Sensors

Project #16



APPENDIX G

SHIPS' RELIABILITY, AVAILABILITY, AND MAINTAINABILITY (RAM) DATABASE

GCRMTC PROJECT NO. AMTC95-018C

Principal Investigator: **Bahadir Inozu**
School of Naval Architecture and Marine Engineering

Additional Researchers:
Philippe Roy
School of Naval Architecture and Marine Engineering

Bulent Yener
Computer Science Department, Columbia / Lehigh Univ.

University of New Orleans
New Orleans, LA 70148

PROJECT SYNOPSIS: To establish an integrated RAM database to collect, process, analyze and disseminate field data from merchant ships for new failures, to download existing ship machinery failure history data from ship logs, to access international RAM databases, to investigate reliability and maintainability of existing shipboard components, and to provide a basis for optimizing maintenance and ship building practices, increasing the reliability, safety and quality of U.S. ship operations and recommending new ship designs.

BUDGET STATUS:

TOTAL AMOUNT BUDGETED	$210,583.00
FUNDS REMAINING	$ 79,643.00

ACCOMPLISHMENTS THIS PERIOD

1. DATE & SHIPPER Test and Modification

Beta Versions 1.06 - 1.08 of RAM Data Entry Program DATE and Beta Versions 1.04 - 1.08 Ship Performance Review Program SHIPPER have been tested extensively at UNO. The DATE and SHIPPER programs are now installed together. DATE and SHIPPER were installed on board a US flag ship of an SOCP member company for end user testing in July 1995.

Based on priority and funding levels, time schedule, further testing and user feedback information, the SOCP executive committee revised the modification tasks listed in the second quarterly report due to the programmer and quote changes, and delays of the current subcontractor. The summary of the revised DATE & SHIPPER modifications, as approved by the SOCP Executive Committee on September 29, 1995, is as follows:

a. Extensions to voyage information to cover voyage legs, anchor events, and dry-dock and lay-by events
b. Removal of repair action dependence upon voyages (repairs can extend across multiple voyages)
c. Ability to modify equipment operation rates under steaming, anchor, port, shipyard/lay-by conditions without losing previous rates
d. Equipment nameplate data expansion
e. Addition of flexible equipment class categories
f Addition of initial operating hours for equipment
g. Temporary corrective repairs will be tracked as a folder until such time as the repair becomes permanent

h. Ability to enter all parts and costs used in the repair

I. Tabular vessel time line display from any starting point to any ending point

j. Ability for the chief engineer to override cumulative operating hours and use this value for future computations. Special treatment of equipment under temporary repair

k. Folder type displays

l. Color coded graphical time line display

m. Header & option & sequence changes

n. Updating help function

o. Standard Windows interface for MDI

Approval for the implementation of these modifications by DCC has been received from GCRMTC's Executive Director.

2. Nameplate Data Transfer and Cross ID Referencing

For the equipment database section of DATE, traceable fields were increased from two fields to seven fields in addition to the memo field. Each equipment will have a company specific confidential name and ID as well as a common SOCP name and ID. Additionally, equipment serial number, manufacturer, model number and type will be directly traceable in DATE's name plate data section. Data initialization fields were also increased to capture equipment running hour percentages at anchor, shipyard/lay-by hours in addition to at sea (steaming) and in port hours. The first phase of cross referencing with company specific identifiers, preliminary SOCP identifiers and STEP AP 226 identifiers has been conducted for the name plate data of ETC, Sea-Land and ARCO's equipment in addition to the preliminary critical equipment list of ABS. ETC and Sea-Land also produced a preliminary critical equipment/system list. ARCO and the USCG are in the process of extracting their preliminary critical equipment lists. Critical equipment lists will be finalized at the annual SOCP executive committee meeting scheduled for November 14-15, 1995.

3. SPIN and Ships' RAM Development

Based on the changes in the DATE & SHIPPER modifications, SPIN specifications have been revised. A general preliminary framework of the Ships' RAM program for current participants is also being developed. Using SPIN for both at company headquarters and the master database as Ships' RAM program at GCRMTC is currently being investigated. Due to re-subcontracting and the possible merger of SPIN and Ships' RAM programs, the start date for SPIN code development has been rescheduled. Developing SPIN to SHIPPER conversion capability is also under consideration.

Dr. Inozu attended ISME'95 on Yokohama on July 17-21, 1995 and presented a paper related to this project, entitled "Reliability Data Banks and Cooperation for Ship Safety Worldwide." Dr. Inozu had two meetings regarding SOCP's International Ship Network initiative and the SRIC

Database of Japan. The first meeting was attended by Mr. Yasuji Kanai who is the Chief of the Safety and Reliability Section at Systems Engineering Division of Ship Research Institute at the Ministry of Transport of Japan, Prof. Magnus Rasmussen who is Norway's representative at ICMES TC-1 (International Cooperation on Marine Engineering Systems - Technical Committee on Reliability, Availability, Safety), Prof. T. Hashimoto, Japan's representative at ICMES TC-1, and Prof. Hiroya Tamaki from Shinshu University, the ex-chairman of SRIC Investigation Committee on July 20, 1995. Prof. Hashimoto outlined his approach to the proposed network. He also announced the formation of a new private group called Kobe-SRIG (Ship Reliability Investigation Group).

A private meeting was also held with Mr. Kanai as requested by SOCP. Mr. Kanai submitted a special report regarding the current status of the SRIC database. Mr. Kanai was transferred from the Tokai Branch in the Japanese Atomic Energy Research Institute to the Systems Engineering Division of the Ship Research Institute and is very familiar with the worldwide Nuclear Network, a role model for the proposed Ship Network. Mr. Kanai stated that the SRIC2.1 database system was improved to two coupled databases which are independent of each other. The first one is the failure database including the original RAM data from ship operators and the other is the Ship Principal Particulars database, including information about 8,600 registered ships classified by the Japan Classification Society, NKK. The latter has been utilized to easily looking up detailed background data required to analyze failure data.

4. DATE Interfaces

Identifying the interface requirements in order to avoid duplication of data entry has begun. Common data fields of DATE, ARCO's and Sea-Land's maintenance management systems have been investigated. Communication with the developers of company specific maintenance management systems is underway for DATE integration implementation.

Mr. Zbigniew J. Karaszewski, the MSTEP Program manager, visited UNO on August 23, 1995 for the initiation of the MSTEP-RAM Database Interface Plan. A draft interface plan has been developed and currently being reviewed by Peter G. Schaedel. The interface plan is expected to be discussed and finalized at the next SOCP executive committee meeting.

Mr. Gene Story and Mr. Michael Barney of MMS had a meeting with Dr. Inozu at UNO on August 28, 1995. Mr. Story presented the on-going MARITECH Integrated Shipboard Information (ISIT) project. Use and testing of the ISIT platform for DATE interfaces and automated RAM data collection were discussed. In addition, DATE's current interface requirements with ARCO's Maintenance Management System, which is currently updated by MMS, was addressed. Dr. Inozu will communicate with the ISIT team to ensure that the platform responds to the needs of the RAM Database.

5. Other

Ms. Veronique Molinari, Mr. Iskender Gursoy, and Mr. Juan Manero joined the UNO team as graduate research assistants for the project. Mr. Manero will spend 50% of his time on this

project, whereas Ms. Molinari and Mr. Gursoy will spend 100% of their time on this project. Mr. Robert Johns, Ms. Sonja Lamb, Mr. Ivan Karadzic, and Mr. Todd Jacobs are working as part time undergraduate research assistants for the project, as well.

Pilot RAM data entry from Ships' log books have been started. RAM data, starting with 1986 failures for a specific piece of equipment, were entered using DATE for one ship. Data entry from other selected ships for the same equipment type is underway.

A subcontract was arranged with Dr. Bulent Yener from Columbia and Lehigh Universities for system administration training and assistance in the operation and maintenance of the Unix based SUN SPARC 20 network at the Reliability, Maintenance and Operation Division of GCRMTC. Dr. Yener conducted a special training session at UNO for the operation of this network in July 1995. Dr. Bahadir Inozu, Philippe Roy, and Trevor Smith attended this training session. Funding for Dr. Yener's services is cost shared between this project and Project #20.

PROPOSED ACTIVITIES NEXT PERIOD:

1. Implement DATE & SHIPPER modifications while continuing to determine company specific interface requirements for the DATE integration for full SOCP members.

2. Coordinate beta testing of the new DATE & SHIPPER programs.

3. Develop SPIN & Ships' RAM software.

4. Participate in STEP AP 226 and other related STEP Application protocol activities under the coordination of the U.S. Maritime Administration.

5. Continue equipment nameplate data cross referencing and coordinate selection of critical systems.

6. Attend the annual SOCP meeting to give a status report, and hold special meetings at the headquarters of selected SOCP members for DATE interface and implementation, SPIN & Ships' RAM development.

COLLABORATIVE EFFORTS:	THIS QTR	YTD
$ VALUES OF SERVICES FROM INDUSTRY:		
IN KIND SERVICES:		
SOCP/ Energy Transportation Corporation	2 man-weeks	4 man-weeks
@$850/day	$8,500.00	$17,000.00
SOCP/Sea-Land Service Inc.		3 man-weeks
@$1000/day		$15,000.00

	SOCP/ARCO Marine Inc.	1 man-week
	@$900/day	$4,500.00

ACTUAL FUNDS:

SOCP: $58,000.00* ($50,000 for Dr.Inozu/UNO + $8,000 for PRC)

$ VALUES OF SERVICES FROM GOVERNMENT:
IN KIND SERVICES:
ACTUAL FUNDS: Same as above*. SOCP is an industry-government cooperative program.

OF SIGNIFICANT CONTACTS: 11
INDUSTRY: P.G. Schaedel (ETC), M. Bohlman (Sea-Land), F. Lee (ARCO Marine), J. Edgar and R. Nagendran (PRC), R. Conachey (ABS).
ACADEMIC: Prof. Magnus Rasmussen (NTH-Norway), Prof. T. Hashimoto (Kobe-Japan)
GOVERNMENT: J. Dumbleton (MARAD), G. Miante and Z. J. Karaszewski (USCG).

COMMENTS:

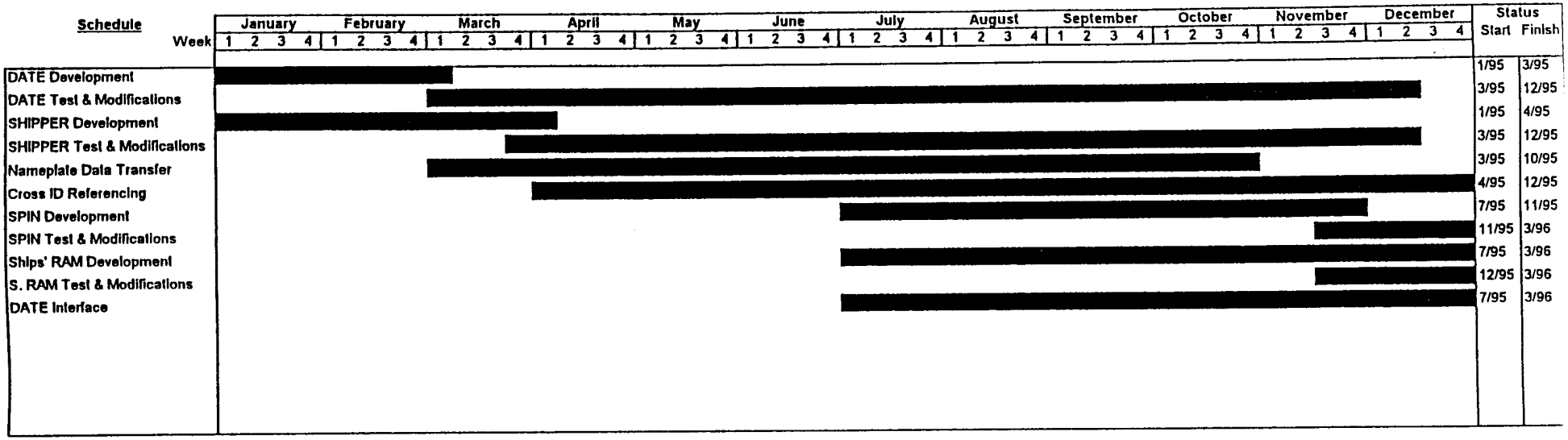
* SOCP provided $58,000 for the RAM Database project for the April 1994-December 1995 period. Formed in April 1993, the Ship Operations Cooperative Program (SOCP) is an industry-led, cost-shared partnership between government and U.S. commercial vessel operators which applies current technology to improve vessel operations. The vision of SOCP is to be the pre-eminent research forum for ship operations and ship management in the US for the purpose of continually improving the competitiveness, productivity, safety and. environmental responsiveness of US shipping operations. The SOCP has two classes of membership in order to encourage the widest possible participation: Member (M) and Associate Member (A). Each member makes an annual cash contribution to the SOCP. Currently this contribution is $25,000. Each member also provides "in-kind contributions" in the form of personnel time (shipboard or shoreside), vessel time, consultant services or material and/or special equipment. These in-kind contributions are entirely voluntary, and are contributed at the discretion of the member. An associate member is a non-voting member of the SOCP and is excluded from participating in any decision making functions of the executive committee. Recently, equipment manufacturers and shipyards in the US are also invited to the SOCP. There is no annual cash contribution to the SOCP for an associate member. However, each Associate Member is required to provide "in-kind contributions."

SOCP provided $43,000.00 to Dr. Inozu in addition to the administration funding to PRC for the first phase of the RAM database project (1993-1994). For the 1995 fiscal year, the total government cash contribution was $ 225,000 and the industry cash contribution was $ 75,000 for SOCP. A quarterly breakdown of the direct SOCP cash contribution is not available since the budgeting is based on the fiscal year. The American Bureau of Shipping is participating in the SOCP only for the RAM database project.

Current Membership of SOCP

1. American Bureau of Shipping (A)
2. ARCO Marine, Inc. (M)
3. Bay Ship Mgt., Inc. (A)
4. BP Oil Transportation Corporation (A)
5. Energy Transportation Corporation (M)
6. Gulf Coast Region Maritime Technology Center (A)
7. Interocean Ugland Management (A)
8. Kirby Corporation (A)
9. Military Sealift Command (A)
10. National Oceanic & Atmospheric Administration (M)
11. Sea-Land Service, Inc. (M)
12. US Coast Guard (A)
13. US Marine Mgt., Inc. (A)
14. US Maritime Administration (M)

Ships' Reliability, Availability, Maintainability (RAM) Database



APPENDIX H

PERFORMANCE SIMULATION OF MARINE PROPULSION SYSTEMS UNDER EXTREME CONDITIONS

GCRMTC PROJECT NO. AMTC95-020A

Principal Investigator: **Bahadir Inozu**
School of Naval Architecture and Marine Engineering, UNO

Additional Researchers:
Philippe Roy
School of Naval Architecture and Marine Engineering, UNO
Jon Etxegoien and **Jonathan DeHart**
Carderock Division Naval Surface Warfare Center
Jean-Francois Hetet
Ecole Centrale de Nantes, France
Kian Banisoleiman
Lloyd's Register, United Kingdom
Martti Larmi
Helsinki University of Technology, Finland
Bulent Yener
Computer Science Department, Columbia / Lehigh Univ.

University of New Orleans
New Orleans, LA 70148

PROJECT SYNOPSIS:

To examine the steady state and dynamic responses of low and medium speed engines to various extreme loads and failure modes using computer simulation. CDNSWC is primarily interested in the most frequently used types of propulsion systems on commercial cargo vessels.

BUDGET STATUS:

TOTAL AMOUNT BUDGETED	$180,841.00
FUNDS REMAINING	$ 10,460.07

ACCOMPLISHMENTS THIS PERIOD:

1. Operation in Ice Brash / Extended Full Load

Simulations of selected engine responses to experimental ice loads were started. These experimental ice loads have been provided by CDNSWC based upon test measurements at Carderock. The first load algorithm was delivered on August 14, 1995, and was slightly modified a few days later. The second load algorithm was delivered on September 19, 1995. This algorithm was later modified twice, on September 21, 1995 and September 28, 1995 by CDNSWC.

Experimental ice loads were simulated at UNO for the Colt-Pielstick 7PC4.2 with both the UNO/ECN Code (SIMBAD) and MERLIN and for the MAN B&W 10L42MC with MERLIN. Additionally, a subcontract was arranged with Dr. Martti Larmi of Helsinki University of Technology (HUT) to simulate these loads for the MAN B&W 10L42MC with his HUT Code. Dr. Larmi completed his model in mid September and sent some preliminary results for the first load algorithm on September 28, 1995.

Certain modifications of MERLIN and the UNO/ECN Code were required in order to simulate CDNSWC's load algorithms. A special training and analysis meeting was held at UNO on August 14-18, 1995. Dr. Kian Banisoleiman of Lloyd's Register, Jonathan DeHart and Philip Jung of CDNSWC, Dr. Bahadir Inozu and Philippe Roy attended this meeting. Jon Etxegoien developed a special algorithm based upon the tests at CDNSWC during this meeting period. MERLIN was modified by Dr. Banisoleiman to accommodate this special algorithm requiring two look-up tables.

2. MERLIN Low Speed

The first results of MERLIN's low speed model for CDNSWC's first load algorithm were obtained on August 18, 1995. The first results for the second load algorithm were obtained on September 29, 1995. The compressor map of the MAN B&W 10L42MC engine has been digitized in order to represent the instantaneous compressor operating point on the compressor map. This new feature allows the determination of compressor surge or choke.

3. SIMBAD Medium Speed / Sample Cases

Preliminary results for the response of the 7PC4.2 to the first load algorithm were obtained on August 18, 1995. The UNO/ECN Code results for this particular experimental load revealed a quasi-instantaneous drop of the compressor volume flow after a certain time of simulation. A numerical deviation problem was later identified and fixed. The entire turbocharger modeling of the UNO/ECN Code was enhanced, leading to a new version. Final results for the first load algorithm were sent to CDNSWC on September 1, 1995. The results for various versions of the second load algorithm were provided to CDNSWC and sent on September 19-29, 1995.

4. MERLIN Medium Speed

Preliminary results for the response of the 7PC4.2 to the first load algorithm were obtained on August 18, 1995. The results for various versions of the second load algorithm were obtained between September 19 and September 29, 1995.

5. SIMBAD Impulse Loads

CDNSWC was interested in the response of the 7PC4.2 for impulse loads which include a load release. A special version of the UNO/ECN code was developed without the governor modeling because CDNSWC did not want any interference from the governor model. Engine responses to various impulse loads were obtained with the new version of the UNO/ECN code (Version 2.0).

6. SIMBAD Modifications

This task refers to the modifications that were implemented necessary to simulate CDNSWC's new load algorithms. Instead of equipping SIMBAD with look-up tables that allow the evaluation of the load, we decided to implement the various equations into the source code to accommodate these new algorithms. This approach gives the exact value of the load with respect to the engine speed and crank angle instead of an interpolated value.

7. MERLIN/SIMBAD Comparison

A preliminary comparison was completed on September 1, 1995. MERLIN and SIMBAD (UNO/ECN) results for the Colt-Pielstick 7PC4.2 have been compared for the steady state and transient runs.

SIMBAD is equipped with a combustion efficiency model, whereas MERLIN is not. Simulation results were also provided to engine manufacturers, Coltec Industries and MAN B&W to obtain their opinions regarding the results. Figure 1 shows an experimental ice load. Figures 2 and 3 show the responses of a prototype engine to this load with MERLIN and the UNO/ECN code respectively. Figure 4 shows the compressor operating point trajectory for the first algorithm with the UNO/ECN Code. Figures 5 and 6 show MERLIN and the UNO/ECN Code results for the first load algorithm for a specific engine.

8. Other Activities

Dr. Inozu attended ISME 95 in Yokohama, Japan on July 17-21, 1995 and presented two papers related to this project. These papers were entitled "Marine Diesel Simulation for Optimum Operation and Fault Diagnosis" by B. Inozu, J.F. Hetet and P. Roy and "An ACSL Simulation Program for Optimizing the Bypass Sections of a Two-stage Turbocharger for a Marine Diesel Engine" by J.F. Hetet, P. Chesse and B. Inozu.

Dr. Inozu met with Mr. Peter Sunn Pedersen from MAN B&W in Copenhagen, Denmark during the ISME'95 conference and obtained confidential engine data required for the project's 10L42MC engine simulation. In addition, Dr. Inozu held several meetings with Dr. Hetet during the conference regarding the engine simulation results with the UNO/ECN code and MERLIN.

Philippe Roy attended the ASME 1995 Fall Technical Conference on September 24-27, 1995 in Milwaukee, Wisconsin, where he presented a paper entitled "Performance Simulation of Marine Diesel Engines Operating Under Extreme Conditions." Dr. Bahadir Inozu, Dr. Jean-Francois Hetet, Philippe Roy and Hugues Gervaise are co-authors of this paper.

Mr. Juan Manero joined the UNO team as a graduate research assistant in August 1995, spending 50% of his time on this project. Mr. Robert Johns is also working as an undergraduate research assistant for this project.

A subcontract was arranged with Dr. Bulent Yener from Columbia and Lehigh Universities for system administration training and assistance in the operation and maintenance of the Unix based SUN SPARC 20 network at the Reliability, Maintenance and Operation Division of GCRMTC. Dr. Yener conducted a special training session at UNO for the operation of this network in July 1995. Dr. Bahadir Inozu, Philippe Roy, and Trevor Smith attended this training session. Funding for Dr. Yener's services is cost shared between this project and Project #18.

PROPOSED ACTIVITY NEXT PERIOD:

1. Run the additional experimental loads with both SIMBAD and MERLIN for the 7PC4.2 and 10L42MC engines.

2. Analyze the results of the HUT Code for the L42MC engine.

3. Complete the comparison of SIMBAD and MERLIN.

4. Compare HUT Code and MERLIN characteristics and results for the L42MC engines.

5. Prepare a special preliminary report for CDNSWC.

6. Communicate with engine manufacturers for final analysis and complete the final report.

$ VALUES OF SERVICES FROM INDUSTRY: THIS QTR YTD

IN KIND SERVICES: Colt Industries, Milwaukee, WI *
MAN B&W, Copenhagen, Denmark*
S.E.M.T. Pielstick, France*

ACTUAL FUNDS: -

$ VALUES OF SERVICES FROM GOVERNMENT:

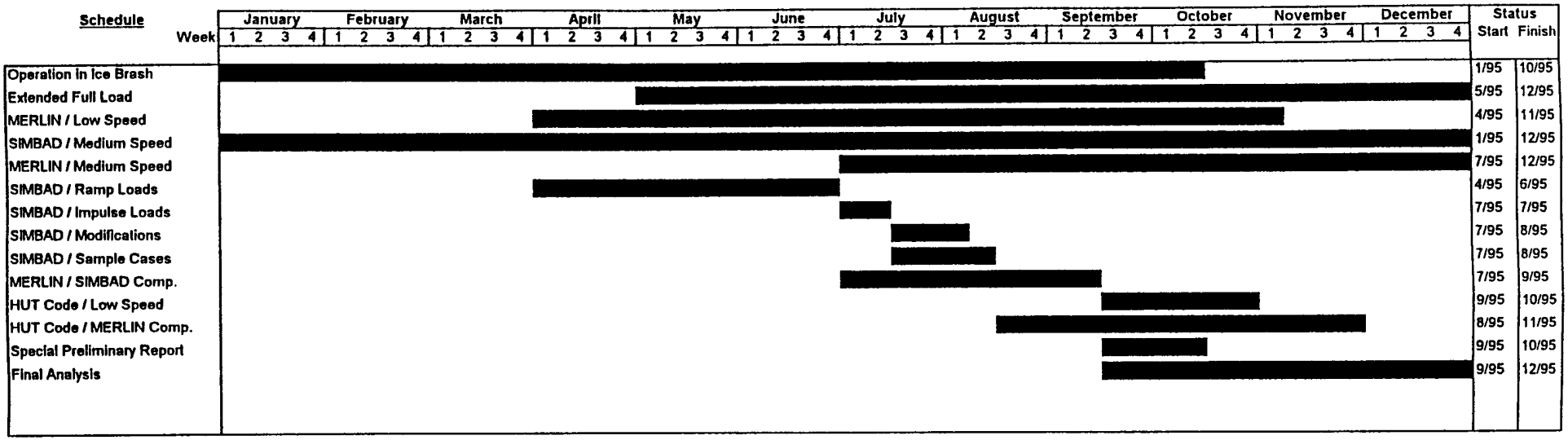
IN KIND SERVICES:	CDNSWC / Jonathan DeHart	1/2 Man -Year
	CDNSWC / Jon Etxegoien	1/4 Man -Year
	CDNSWC / Phil Jung	1/4 Man - Year
	Total CDNSWC	$110,000.00

ACTUAL FUNDS:

OF SIGNIFICANT CONTACTS: 10
INDUSTRY: Angelo Mazzenga and Greg Gutoski, Colt Industries, Peter Sunn Pedersen and Eric Rosenlund, MAN B&W (Denmark), S.E.M.T. Pielstick (Via Dr. Hetet, France), Kian Banisoleiman, Lloyd's Register (UK).
ACADEMIC: J.F. Hetet (ECN), M. Larmi (HUT), B. Yener (Columbia/Lehigh)
GOVERNMENT: J. DeHart and J. Etxegoien, Carderock Division Naval Surface Warfare Center

COMMENTS:
*Engine manufacturers Colt, MAN B&W and S.E.M.T. Pielstick have been providing confidential engine and test bed data for validation and examining simulation results continuously.

Performance Simulation of Marine Propulsion Systems under Extreme Conditions



APPENDIX I

STUDY OF STRUCTURAL DESIGN PROCEDURES IN THE SHIPBUILDING INDUSTRY

GCRMTC PROJECT NO. AMTC95-023B

Principal Investigator: **Michael Folse**
Department of Civil and Environmental Engineering

Additional Researcher: **Norma Jean Mattei**
Department of Civil and Environmental Engineering

Additional Researcher: **José Marcio Vasconcellos**
Department of Naval Architecture and Marine Engineering

University of New Orleans
New Orleans, LA 70148

PROJECT SYNOPSIS:

This study originally involved a survey of the design procedures currently in use in the shipbuilding industry. Once this was accomplished, the feasibility of improving these existing procedures through the use of a Load and Resistance Factor Design (LRFD) probability-based method of ship design was to be researched. Both onshore structural steel building codes (American Institute of Steel Construction - AISC) and offshore steel codes (American Petroleum Institute - API) have already incorporated an LRFD method into their specs and so it was felt that the shipbuilding industry is lagging behind by continuing to employ empirical rules as design guidelines.

During the preliminary design procedure survey, the original PI's found that there are three levels of design in the shipbuilding industry. The lowest level of design (and the one used almost exclusively by ship designers) is the "rules". These rules, specific to each certification agency, are empirically based on what has historically yielded a relatively safe product. The highest level of design is a probability of failure-based procedure published by the Ship Structures Committee. This level is not sufficiently developed for practical use in industry for ship design (too many simplifying assumptions), but represents the present state at which researchers are with respect to creating a reliability-based design method. Somewhere between the empirical rules and the subsequent probability-based procedure is a rational design method using quantified loads and load factors in conjunction with a finite element analysis for ship design. Most of the major certification agencies have either recently published or will soon publish this type of design method. Because rational design signifies a break from traditional methods of design and requires a dedication of significant man-hours in order to learn a new procedure, many ship designers are hesitant to change from their old methods of design and learn the new procedure. However, certification agencies are slowly progressing toward making rational design a requirement for many vessels.

With the mission of the GCRMTC in mind, the PI's decided that domestic shipbuilders would be best served by focusing the project effort on a comparison of the structural requirements of the ABS Rules versus ABS SAFEHULL Program for several components at midship of a tanker. Furthermore, the bases for each of these two approaches will be evaluated and compared, particularly with respect to their effect on the economics of the ship structure. It may also be noted that Dr. Vasconcellos of the UNO NAME Department was added to the team. We will additionally study the influence of corrosion allowances on long term vessel performance and economics.

BUDGET STATUS:

TOTAL AMOUNT BUDGETED:	$90,746
FUNDS REMAINING:	$44,172

ACCOMPLISHMENTS THIS PERIOD:

NOTE 1: *This project was approved to start mid-March of 1995, rather than the usual start date of January. The time line that is attached to this report is indicative of this delay in beginning work.*

NOTE 2: *This project has evolved in size and scope. Please see the above revised "Project Synopsis" and "Budget Status", as well as the attached time line with the revised tasks, for these changes and additions.*

1. The PI's identified the American Bureau of Shipping's (ABS's) SAFEHULL system as an intermediate level between rules-based and a probability-based design procedures. In order to better serve the domestic shipbuilding industry, it was decided that this project focus on evaluating some key structural elements at midship of an existing vessel using both ABS Rules and SAFEHULL.

2. Mr. Ram Mohan, the initial graduate assistant hired, began work on the project in late August. Two NAME graduate students have been hired at 50% time for the duration of the Fall semester, Ms. Rajani Kandarpa and Mr. Sudhakar Tallavajhula. They are familiar with the rules of several certification agencies.

3. SAFEHULL for bulk carriers was acquired and studied. Scantling drawings and design calculations of McDermott Shipbuilding Inc.'s (MSI's) vessel were studied, but using that ship as a basis for this comparison was abandoned. The MSI ship is a combination container-bulk carrier; the design of this type of ship has not yet been addressed by SAFEHULL. SAFEHULL System for Bulk Carriers is written for the design of bulk carriers that meet specific geometric and structural parameters.

4. A tanker was selected as the vessel type for comparison purposes since it has the simplest structural form and was the first vessel type addressed by SAFEHULL. The SAFEHULL System for Tankers was acquired and temporarily installed on a departmental computer normally dedicated for other purposes but capable of running the software package. Although purchase of a PC computer was not within the scope of the original project, the inclusion of a SAFEHULL evaluation has prompted a request for one . The tanker parameters to be met for applicability with respect to use of SAFEHULL were identified.

5. MSI and A. K. Suda were contacted in the search for drawings and a loading manual of a tanker which would fit the requirements of SAFEHULL. Since the vessel must be double hull in order to meet recent federal regulations and satisfy SAFEHULL applicability requirements, the pool of available tankers is quite small. The proprietary nature of these documents is also constraining the search.

6. Test runs of SAFEHULL *"phase a"* have been run. The SAFEHULL software package is divided into two phases, *"phase a"* that generates a preliminary design and *"phase b"* that incorporates the preliminary design into a finite element mesh, runs the finite element analysis, and modifies the design appropriately.

PROPOSED ACTIVITIES NEXT PERIOD:

1. Acquisition of a computer dedicated to this project is essential. A PC capable of running both phases of SAFEHULL should be purchased and the software packages installed in October.

2. An applicable tanker will be identified and the drawings and loading manual acquired.

3. Once initial runs of SAFEHULL are complete, a representative from ABS will be scheduled to visit UNO to provide guidance and answer any questions that may arise regarding the assumptions and procedures within the program itself.

4. Evaluation of the tanker according to the rules and also SAFEHULL will be ongoing at the same time and complete by early January.

5. The team will determine corrosion allowance, probability distribution, and targeted ship life used within SAFEHULL. The lifetime required historically by owners of existing tankers will be ascertained.

6. SAFEHULL will be used to study the effect of varying the corrosion allowance on initial costs versus additional ship life and reliability.

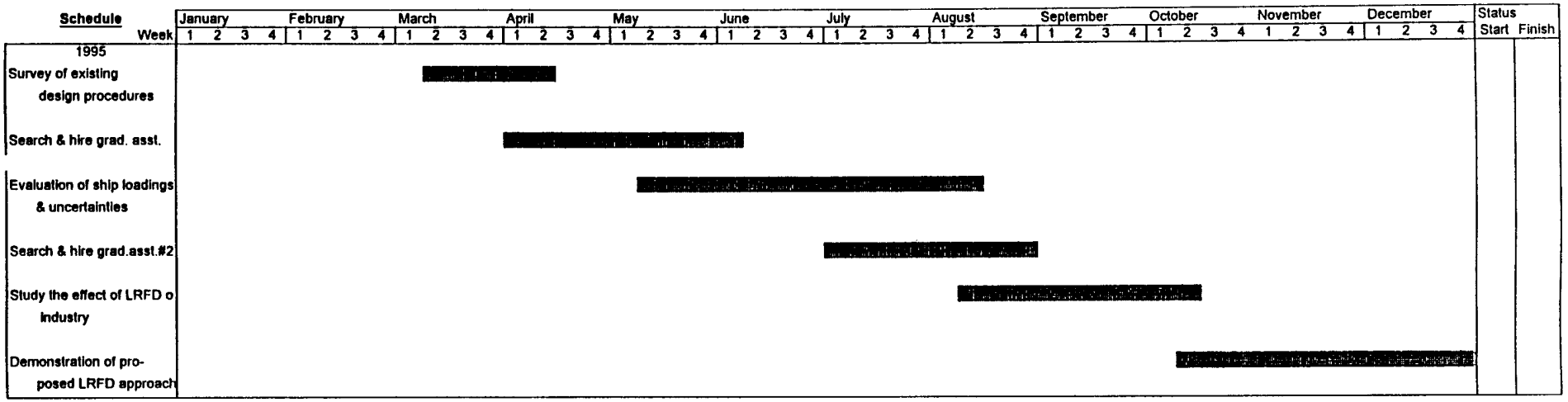
7. A final report will include a comparison of the two procedures, rules and SAFEHULL, as well as an examination of probability-based design and its potential impact on tanker design in the future. Also included will be recommendations for optimizing ship life with respect to corrosion resistance.

COLLABORATIVE EFFORTS:

	THIS QTR	YTD
DOLLAR VALUE OF SERVICES FROM INDUSTRY		
IN KIND SERVICES:	$100	$600
ACTUAL FUNDS:	0	0
DOLLAR VALUE OF SERVICES FROM GOVERNMENT		
IN KIND SERVICES:	N.A.	N.A.
ACTUAL FUNDS:	N.A.	N.A.
NUMBER OF SIGNIFICANT CONTACTS		
INDUSTRY:	3	9
ACADEMIC:	0	2
GOVERNMENT:	1	2

COMMENTS: none

Title Study of Structural Design Procedures In the Shipbuilding Industry GCRMTC Project #23 Folse/Mattei



APPENDIX J

SOFTWARE APPLICATIONS FOR SHIPBUILDING OPTIMIZATION

GCRMTC PROJECT NO. AMTC95-027C

Principal Investigator: **Norman L. Whitley**
Department of Mechanical Engineering

Additional Researcher: **Stephen C. Lipp**
Department of Mechanical Engineering

University of New Orleans
New Orleans, LA 70148

PROJECT SYNOPSIS: This proposal calls for the investigation of current shipbuilding methodology and the incorporation of computer-based procedures in shipbuilding design and manufacture.

BUDGET STATUS:

TOTAL AMOUNT BUDGETED:	$185,389
FUNDS REMAINING:	$96,615

ACCOMPLISHMENTS THIS PERIOD: Accomplishments to this date are in five areas: 1) search and exploration of software possibilities for the advanced computer laboratory for shipbuilding (ACLS), 2) purchase of computers for the ACLS, 3) purchase of preliminary software for the ACLS, 4) attending meetings, and 5) conceptual research into expert system development.

1. Software Possibilities.

Software consideration and exploration was extended to many software packages. These software packages for shipbuilding can be divided into three general classes:

A. Languages---necessary for software development.

Smalltalk (ParcPlace, Inc.)---basic object-oriented programming language. Like C++, has the capability to encapsulate, handle, and dispatch events. Unlike C++, has much less overhead (a smaller built-in library of routines) and is much more mnemonic. Has built-in hierarchy and inheritance capabilities.

UniSQL (UniSQL, Inc.)---object-oriented relational database management system (ORDBMS). This provides an effective way to machine-query object CAD databases, searching for specific items. Will prove invaluable in the development of the expert system for standards.

CLIPS version 6.0 (Johnson Space Center)---shareware NASA expert system development software. Written in C++, so will require the purchase of a C++ compiler\ debugger\ visual manager. Provides a proven engine to build an artificial intelligence (AI) system to verify ship's adherence to standards.

B. Ship Design

Prolines (Vacanti Yacht Design Software)---a B-spline surface modeler for hull fairing. Contains many capabilities and a small price tag.

Vellum (Ashlar/Vellum Inc.)---PC CAD software. With a brief look at their demonstration package, this software was deemed unnecessary. It lacked an object basis and appears to be a 3-D extension of 2-D CAD.

Fast Ship (Proteus Engineering)---fairing tool for ship hulls, decks, superstructures, etc.

Maestro (Proteus Engineering)---advanced hull modeling and optimization.

C. Management

Perception, Esti-Mate, Mat-PAC (SPAR Associates)---project management, estimation, and material management specifically catered to the needs of shipyards. Handles both personnel and materiel.

Ship\CMS and MasterModel (CSA)---configuration management systems. CSA created MasterModel as an addition to Ship\CMS. In MasterModel, the configuration management system is driven with CAD models of the ship whereas in Ship\CMS, the configuration management system is driven by the user through a language developed at CSA.

SPAR Associates' Perception, CSA's Ship\ CMS, and Maestro are bundled into the Flagship package. The bundled package will be available in November 1995.

Sherpa (Sherpa Corporation)---product information management system.

Visual Manufacturing (Lilly Software)---production management software for PC\ Windows.

AutoWork (CYCO International, Inc.)---production workflow for PC\ Windows.

CAS.CADE (Matra Datavision)---development environment geared toward CAD. CAS.CADE provides object-based toolkits for the development of computer aided design tools. It contains a substantial library of 3-D CAD tools and a seamless graphical user interface. The development environment is further aided by templates and menu-driven tools for the development of CAD software. Further customizations are attainable with object-coding of specific enhancements.

The capabilities of vertically-integrated, ``high end" 3-D product models can be attained with inexpensive modular software. Modular design means that further capabilities may

be added to the package at a later date by adding an appropriate module. With an appropriate package, additions may be developed in-house or purchased from vendors.

A seamless form of modular software design is obtained with the use of object-oriented programming tools. In object-oriented programming additional capabilities are added to the software by appending ``modules," which correspond in some way to subroutines in standard in-line code. Modules in object code carry more capabilities in an object framework.

For example, a subroutine describing a pipe might contain geometric information about the pipe, such as diameter, wall thickness, flange thickness, length, etc. However, another subroutine would be necessary to determine how to display the pipe in a view, and further subroutines would be necessary to determine interference checking between the pipe and neighboring objects. Further routines might describe material and processing specifications for the pipe.

In an object framework, the pipe would have a few unique attributes which would describe its geometry, material, processing specifications, etc. The rendering of the pipe in a view would be inherited from the geometric class of objects of which ``pipe" is a member. Interference checking between the pipe and other objects would be handled by higher level ``topology." Material and processing data would be encapsulated within the pipe description so that the pipe would have such data available for use by higher level routines or even external querying.

The object framework provides a simple method by which to create the capabilities of 3-D product modeling without the burdensome overhead and rigidity associated with fully-integrated 3-D product modeling packages. Furthermore, object-oriented programs and object modules provide the end user with the capability to tailor specific programming components directly to their environment. Thus if the shipyard does not need the capability of a specific process in a 3-D product modeling software package, the module associated with that process need never be purchased.

Object-oriented programming languages have enormous advantages over traditional procedural languages in many applications. In the areas of concentration that we have delineated, their advantage is enormous. Applications can be made in modular pieces. These pieces can share information via commonly defined object structures. Objects can be given numerous attributes, not all of which are used in every application. The objects are automatically catalogued by their association with other objects. New applications can be created that use objects that already existed. Procedures exist that are object specific.

For these reasons and more we have decided that this is the most appropriate area for our research efforts in the coming year. With existing 3-D product modelers we can do no more than serve as an educational site for the particular product we choose. We do not see that as the best use of our time or the Center's money.

Working with object-oriented packages we have the opportunity to expose the American shipbuilding industry to an emerging technology that we truly believe will be the way of the future. We have the opportunity to profoundly effect the way that that industry does business.

2. Computers purchased:

The ACLS has procured four 90 MHz Pentium PC's. Three of these machines are operating with Windows NT; the other is a DOS\ Windows for Workgroups platform. Most ``low-end'' shipbuilding industry software runs under Windows NT; for the few pieces of PC software that do not, the DOS / Windows for Workgroups platform accommodate. All machines are networked using thin Ethernet cabling tied to an NT server. The server contains a DAT tape backup unit and a quad speed CD-ROM. The Windows NT server license is expandable so that future platforms may be added when necessary.

3. Software purchased:

The ACLS has purchased three CAD packages: 1) AutoCAD Revision 13 (Autodesk), 2) CADKEY 7.2, and 3) CADKEY Professional (Cadkey Inc.). AutoCAD runs on Windows NT, Windows, Unix, and DOS. Currently we are using AutoCAD on the NT platform. Some of the peripherals to AutoCAD (AutoDesigner, AutoVision) have not been ported to Windows NT. CADKEY 7.2, an object-based CAD package, uses Windows NT. CADKEY Professional consists of: (1) CADKEY 7.2; (2) CADKEY Analysis, an integrated boundary element method-based analysis module; (3) an Advanced IGES data translator; (4) the CADKEY Advanced Modeler; (5) FastSURF LITE, a third-party 3-D surfacing package from FastSURF, Inc.; and (6) DRAFT-PAK, a third-party drafting enhancement package from Baystate Technologies.

The ACLS has submitted purchase requests for Visual Works by ParcPlace Inc., a Smalltalk development environment. This is the tool that will be used for project management\ engineering data management.

4. Meetings attended:

A meeting at Avondale, arranged by Steve Maguire, Assistant to the Corporate Vice President & Shipyard Manager, and his assistant Shawn Wilkerson, these people were present:

Richard L. Buckheister, Senior Naval Architect, Ship Design Department
Bobby J. Griffin, Project Administer
Ronald Landry, Assistant Director, Information Resources
David Bergeron, Vice President of Operations Planning and Scheduling
Leroy Morvant, Project Manager, Material Department
Woody Oge, Vice President

Joe Busch, Project Management
B. J. Griffin
as well as 10 others.

An extensive discussion of the four identified areas of interest was held. For the discussion of each area different people had been invited to be present.

A. Summation of Meetings:

Avondale has a limited network that is yard-wide. Certain business areas have networks of their own. They are in the process of adding networking that will connect the whole yard.

Avondale has the resources to afford 3-D product model software, and they have evaluated several. They are in the process of purchasing one, mostly because of their desire to compete for the production of a ship for the USN, for which 3-D product models will be required as a part of the deliverables. Of the characteristics that they listed that a 3-D product modeler must have, flexibility of function and adaptability of output were high in priority. They had in fact ruled out several product modelers because of their rigidity.

They currently use several different packages to accomplish their design, some which they have written in Fortran and reside on mainframe computers. Their packages are not integrated, but they have built ``work-arounds" over the years that work for them.

They currently use several packages for project management. Once again, some of them reside on mainframes and others on PC's. They are not integrated or networked but do share data via diskettes. They have developed a customized system consisting of numerous packages that share information via human interaction (it is not one database being used yard-wide).

They are interested in EDI and understand its potential. They would like to be able to share design data within the yard electronically and would like to share data with sub-contractors if their concerns about security can be addressed.

With regards to Standards and their use in commercial design, B. J. Griffin, a member of the SP-6 panel committee, said that what was needed more than an expert system to help use standards in design, was a consensus about which standards to use. He describe the problem of standards as being overwhelming.

S. Lipp and N. Whitley had a second meeting with the Bollinger Shipyard in Lockport where we met again with Chief Engineer John Burson and Darren Savoye, a member of the design staff. We asked specific questions of Burson and Savoye about the current design and management structure at the shipyard. They pointed out to us that only 25% of their business involves ship design and build. 45% of their business is in modifying

existing designs, with 30% being the building of existing designs. Bollinger has recently purchased several PC-type CAD workstations. They are in the process of networking these machines and are in the planning stages of networking the entire yard.

Bollinger is another small-to-medium yard that has a large investment in AutoCad, although theirs is recent; they are in the process of giving up micro\CADAM. They see it as adequate for the most part but still use CADAM on a mainframe to compliment AutoCAD.

They expressed interest in EDI but had no plans to use it. They expressed a need to be shown its effectiveness as a business strategy before they invested in an EDI system.

They along with Avondale seemed to be bewildered about the problem of standards for use in commercial design. The standards that interested them most were Lloyds' specifications for registry (because of a North Sea project), DNV, SOLAS, and U.S. Coast Guard. Their current engineering design and production problems appear to lie specifically in purchasing, material requisition, and yard loading, the latter being of primary importance due to their confined physical layout. As such, we are attempting to determine how to implement yard loading and scheduling issues into object-based software which uses the information from generalized 3-D CAD models of ships, along with plant layout and inventory data.

N. Whitley went to Trinity Shipyard in Gulfport. In a meeting with Phil Nuss, Vice President of Engineering at Trinity Shipyard, Gulfport, MS. Whitley relayed to Mr. Nuss the essential information about the four areas of concentration that we have chosen. Trinity is one of the yards which has a huge investment in terms of money, knowledge, and legacy in AutoCad. They are hesitant to give it up even though they realize that they do not get what they need out of it. Of the needs Mr. Nuss listed, a high priority was a software package that would take DXF format from AutoCad and produce parametric entities. Additional areas he listed where software could help included: material tracking and inventory control, engineering change control, and NC tool path generation. His yard is very interested in the advantages of EDI although it doesn't know anything about it. He was not aware of the ECRC's or their mission.

From these visits and from discussion with other shipyard personnel in person and over the phone, we have concluded that the four areas where we have chosen to work are in fact important to the survival of American shipyards. We have been re-enforced in our belief that highly integrated vertical CAD systems is not what we should be working on. Shipyards need powerful CAD, and STEP-compliant product models, but they also flexibility and modularity. They need CAD that does not re-define the way that they approach production unless such redefinition represents sound business practice. They need CAD for which their long-term investment does not encumber their ability or willingness to change the way they do things in the future.

In the areas of project management, engineering data management, and production scheduling they need products that can be tailored to their needs and assets. They all have legacy data and they cannot afford to give it up.

Even though we had initially stated that we would pursue 3-D product modelers we are now convinced that the emerging power of object technology is the most reasonable and economically viable approach to their problems. It possesses all of the characteristics that make it the best answer to their combined design\ manufacture\ business questions.

GCRMTC\ Orange. N. Whitley and S. Lipp attended a Friday meeting with H. Bruce Bongiorni of Lamar University\slash Orange. We were afforded a lengthy demonstration of their design visualization tools. We discussed proposed strategies for implementing computer technologies into the shipyards. We continue to stay informed of their efforts. Their emphasis is on high-end design visualization tools. Our object-oriented development strategy is being considered by the people at Orange as a means of accomplishing simulation-based design without a single-package framework. Currently no vertically-integrated 3-D product modeling package provides them with all the capabilities they require. We may be able to contribute to their research with our object-technology approach.

N. Whitley attended an EDI seminar presented by the ECRC\Orange at the JEDCO Center in Harahan, LA. Communications with the ECRC\Orange have not been easy in these past three months. Numerous attempts on our part to initiate coursework for EDI using the ECRC\Orange as a resource have resulted in little or nothing. Dr. Whitley took the opportunity to attend a meeting on the usage of EDI in the bidding process for government agencies to establish personal contact with the working staff of the ECRC\Orange.

Although Whitley did meet with one of the senior staff of ECRC\Orange (having dealt with 6 different people so far), this did not result in the prompt action that we had hoped. It did lead to preliminary work now being done by the ECRC\Orange on the EDI workshop\seminar, which has a scheduled finish date of 10\20\95.

CinCOM. Dave Sonnen and JeAnne Keal. We were informed of the broad range of services provided by Cincom, Inc. Two divisions of Cincom were represented: the division that is responsible for business control of highly engineered products, and the division that is responsible for TotalFramework, the object-oriented relational database management system (ORDBMS). Although both divisions could offer software that would be of use to shipyards, TotalFramework is the product that fits well with what we are doing.

TotalFramework includes these three main pieces: an ORDBMS, an application development environment, and a workflow management system. This highly integrated package would allow for development of powerful modules in all phases of project

management including production, information management, scheduling, materials control, etc.

The ORDBMS of this system is written using UniSQL but includes the ability to do purely relational database management if necessary. This product is under strong consideration as the tool in which our project management modules will be developed.

Parametric Technologies. Richard Duggan and Rob Binder. PRO\Engineer's inherent parametric capability takes it one of the most desirable of the high-end 3-D product modelers. Any attempt to provide 3-D product modeling capability should provide parametric capability.

Matra Datavision. David Brazier and Claude Hussenet. Negotiations over a business model for the use of CAS.CADE in American shipyards are still underway. They are committed to getting their package into our lab, and through the lab into the shipyards in a way that makes economic sense.

PhotoShipCD. Ray Broussard. Has spent considerable time and effort developing a computer-based system for the walk through of an ``as built" ship. By storing video images (photographs) on a computer and cataloging them appropriately, he allows a person to inspect the geometry of a ship remotely. In a sense, this software may provide a comparison between the visualization tools in a 3-D product model and the as-built item.

5. Conceptual Research Into Expert System Development:

The Compendium of Standards NSRP document, NSRP 0361, was an attempt to create a database with standards from the shipbuilding industry. While the effort is to be appreciated, the actual implementation of the results was not particularly useful. The ultimate difficulty lies with the actual input of the data. Data in the database consists of all relevant topics referenced in a particular standard and then the standard number, including the standard organization. A much better implementation would have had the actual standards in the database.

The attempt to develop an expert system of standards was based initially upon the existence and usability of the Compendium of Standards. The idea was to use the information in a 3-D CAD model of the ship and check this information against the standards in the Compendium. Unfortunately, the Compendium does not have the specificity necessary for this comparison.

Recently, contact was made with the Information Handling Services to obtain a CD-ROM version in English of commercial shipbuilding standards from the Japanese Standards Association. Unfortunately, the IHS does not present JIS in English in the same format as the original Japanese standards. Therefore, it is not possible to buy Volume F of the JIS, which is their volume of shipbuilding standards. Instead, the IHS supplies the format under generic headings, such as electrical\electronic, fluid systems\fasteners\heat transfer,

etc. In order to obtain all of the English specifications for Volume F of the JIS, it would probably be necessary to purchase the entire JIS. The cost of the JIS is $15,000 for one year, which is prohibitive.

After a meeting with William Greene, chairman of the University of New Orleans Department of Computer Science, it has been decided that the way to proceed in the development of the expert system for standards is a three-faceted attack: 1) develop a ``natural language" parser\translator to take the standards and turn them into a relational database; 2) develop CAD software tools to take information in the CAD representation of a ship and turn that into a database; and 3) develop the expert system to take data from the CAD database and formulate queries for the developed standards relational database. Each of these points will be easily equivalent to graduate degrees for engineering or computer science. At the present time a graduate student in mechanical engineering is applying himself to problem 1 in pursuit of a thesis.

PROPOSED ACTIVITIES NEXT PERIOD:

1. Student Activities

For the fall semester, S. Lipp has two students working. These students are taking two different 3-D CAD software packages (CADKEY 7.2 and AutoCAD Version 13) from the ACLS and running baseline testing. This testing will come from the point of view of ship design. The initial time period is spent learning the CAD system. The students have not been given vast libraries of tutorial material; each student has started with the manuals and CAD experience they have gained in the initial engineering graphics course.

2. Electronic Data Interchange

ECRC\Orange will be presenting an EDI workshop\seminar at the University of New Orleans in early November. The EDI meeting has a scheduled finish date of 10\20\95. We are counting on the ECRC\Orange to handle the major part of this seminar, being as that is their job.

The proposed workshop topics are: (1) introduction to electronic commerce (EC), (2) issues in EC applications for life-cycle functions (procurement\design\ manufacturing\planning), (3) legacy data management, (4) collaborative engineering techniques and tools, (5) re-engineering methods, strategies, and project management tools, and (6) Continuous Acquisition and Life-Cycle Support (CALS).

3. Concurrent Engineering

We have received permission from Jack Byrd to disseminate integrated product development (IPD) information into the Center for Entrepreneurial Studies & Development. It is important for this project to maintain its focus in Concurrent

Engineering (CE). By making our CE information available to the Center, it will enable us to remain current in this area and to provide us with a business\management viewpoint for our development efforts.

4. Lab Development

We will be placing another piece of hardware into the lab in the next period. This will be a DEC-Alpha workstation running Unix. The reason this hardware is necessary is that the CAS.CADE software package, and some of the older packages of shipbuilding software manufacturers, require the Unix operating system. Typically in the shipyard there are a few Unix workstations with these necessary pieces of software. The advantage of the DEC-Alpha is that they have the Unix operating system and they also have the capability for Windows NT.

5. Work Commencement

Work on the following topics will begin on the given dates:

EDI Course/Workshop - 11/1/95
Expert System for Standards - 10/1/95
Module Development
DXF to STEP Module - 11/1/95
DXF to Parametric Module - 10/1/95
Interference Module - 11/1/95
Project Management Module - 10/1/95

COLLABORATIVE EFFORTS

$ VALUES OF SERVICES FROM INDUSTRY

IN KIND (except for standard and non-standard academic discounts on software licenses that we have purchased nothing truly falls into this category at this time.

ACTUAL FUNDS (none)

$ VALUES OF SERVICE FROM GOVERNMENT

IN KIND (none)

ACTUAL FUNDS (none)

OF SIGNIFICANT CONTACTS

INDUSTRY:

Shipyard:
John Burson, Chief Engineer & Darren Savoye, Naval Architect and Project Engineer, Bollinger Machine Shop and Shipyard
W. Phillip Nuss, Vice-President - Engineering, Trinity Marine Group
Stephen Maguire, Assistant to the Vice President and Shipyard Manager; David Bergeron, Vice-President of Operations Planning and Scheduling; and others, Avondale Shipyards

Software Vendors:
The list of contacts with software vendors is lengthy and will not be included for the sake of brevity. It will be supplied upon request.

ACADEMIC:

Dr. Jaime Nino, Department of Computer Science, University of New Orleans.

Dr. William Greene, Department of Computer Science, University of New Orleans.

GOVERNMENT:

Cecil Joe, Tina Kwahab, and others of the Electronic Commerce Resource Center - Orange. The ECRC is not truly a government agency but it is an agency that is solely supported by the federal government.

COMMENTS:

Although our collaboration in terms of identifiable dollars amounts has been slight up until the present, our communication with shipyards and software vendors has been extensive and ongoing. We expect that within the next period that collaboration on one or more of our efforts will be more concrete.

RESEARCH STUDY WORK SCHEDULE

TASKS		TIME IN MONTHS		
No.	Description	OCT	NOV	DEC
1	COMPLETION OF ACLS HARDWARE			
2	COMPLETION OF ACLS SOFTWARE			
3	EDI COURSE/ WORKSHOP			
4	EXPERT SYSTEM FOR STANDARDS			
5	DXF TO STEP MODULE			
6	DXF TO PARAMETRIC MODULE			
7	INTERFERENCE MODULE			
8	PROJECT MANAGEMEN MODULE			
9	FINAL REPORT			

APPENDIX K

IMPROVING TECHNOLOGY TRANSFER IN THE SHIPBUILDING INDUSTRY

GCRMTC PROJECT NO. AMTC95-030C

Principal Investigator: **William Lannes, P.E.**
College of Engineering

Co-Principal Investigator: **James Logan, Ph.D.**
College of Business, Department of Management

University of New Orleans
New Orleans, LA 70148

PROJECT SYNOPSIS: The purpose of this project is to develop an improved technology transfer process, incorporating change management techniques, for use in the shipbuilding industry. The deliverables from this project consist of an improved technology transfer process, incorporating industry best practices and current knowledge of organizational change into a matrix evaluation model, and its accompanying implementation protocol. The process incorporates financial, technical, and behavioral factors into a normative model designed to enhance organizational technology transfer. The model is for use by firms in the shipbuilding industry to evaluate current firm practices against best practices and to identify target areas for improvement within a firm. The improved process model identifies significant stakeholders in the technology transfer process and incorporates their needs. The model is customizable to individual firm requirements to insure maximum usability. Additional benefits of this project are the generation of a current, focused data base on the subject of technology transfer in the shipbuilding industry, and increased understanding within both the College of Business and the College of Engineering at the University of New Orleans of a very significant regional industry.

BUDGET STATUS:

TOTAL AMOUNT BUDGETED:	$127,569
FUNDS REMAINING:	$39,786

ACCOMPLISHMENTS THIS PERIOD

1. Completion and mailing of survey - The survey instrument has gone through several iterations and is currently being mailed to participants. It is expected that this survey will confirm portions of our initial model as well as, through the use of open-ended questions, suggest new subjects or processes of concern to organization members in shipbuilding companies. The target population for this survey is organizational members involved with innovation and technology transfer in firms in the United States shipbuilding industry. There are multiple uses for the data gathered with this survey. So far, there have been 138 surveys mailed to 46 firms. There are an additional 75 firms in the sample to whom surveys will be mailed. We are examining the returned surveys to determine if anything should be changed before our second mailing. In addition, we are working with the GCRMTC staff to determine if there are additional shipbuilding companies with significant technology transfer expertise that are not in our compiled mailing database.

The survey enables the researchers to identify those firms that have more successful technology transfer processes and thus begin construction of a best practices database to

add to our literature search database of best practices.. We will be able to identify those shipbuilding industry participants that have the most innovative technology transfer processes and a willingness to share that information. Additional follow-up visits and surveys will be utilized to gather additional information from these identified industry leaders.

2. Completion of data base (print and electronic) of technology transfer as it relates to shipbuilding . One of the primary activities of this project for the past few months has been research and acquisition of print and electronic sources of data on technology transfer in shipbuilding. The attached index illustrates the current holdings in this database.

3. Start of proof of concept expert system to incorporate part of knowledge acquired through acquisition of the data base. The graduate student that worked on this project for the past year, Bryant Hazard, is working with Dr. Logan to develop a proof of concept expert system to incorporate a portion of the recommendations developed from the literature review and survey data. It is expected, if this project is funded for a second year as originally planned, that the information gained from the survey would be incorporated into the expert system. The proof of concept expert system will concentrate on two areas, evaluation of organizational climate for innovation, and recommendation of measures for efficacy of innovation based on that climate evaluation. The system is being programmed using C++.

4. Identification of industry partners for second year of project. The probability of success of this project and the follow on is enhanced by the interdisciplinary make-up of the project team. Many times during the course of the research to date the differing perspectives that the individual team members bring to the project has substantially aided the understanding of the technology transfer process in the context of the shipbuilding industry. This team is strengthened by the addition of two industry partners for the proposed second year of the project. Manager of Advanced Technology for Ingalls Shipbuilding, Raymond Johnston, and project manager for McDermott Shipbuilding, Michael L. Landon, both of whom will provide valuable insight to the project as well as provide test sites for the protocol and model developed with this project. They will be involved with testing the model against past successes and failures of innovation as well as with new innovation implementation.

5. Contact with Dr. Patricia Pate from the John Gray Institute who is working on a similar GCRMTC Lamar project. A collaborative effort has been discussed with Dr. Pate.

PROPOSED ACTIVITIES NEXT PERIOD

1. Analysis of data gathered from survey - We will continue mailing surveys and follow- up on survey nonresponse during the next quarter. As the responses are received,

they are logged and the data entered into our data base. We are currently beginning analysis of the initial responses. The majority of this work should be done by the end of next reporting period, unless the surveys lead us to examine an area we had not anticipated.

2. Design of overall measurement model for technology transfer based on survey results -As the survey results are analyzed, we can determine if the results of the survey fit with our hypothetical technology transfer model. If so, we can then move on to step 3, below.

3. Test of model against past technological innovation with industry partners to determine predictive ability and refine measurement capability. We will work with industry partners to determine if our model is congruent with the technology transfer process as it occurred in past instances. If so, we will work with industry partners and other GCRMTC projects to evaluate the model and protocol under field conditions. This step will not be completed in the next quarter, as its completion depends upon funding for the second year of the project.

4. Preparation of scholarly paper detailing work done on project to date to include significant findings. The findings of this project should be reported in the engineering and management scholarly publications. However, the primary purpose of this project is to work with industry partners to improve the technology transfer process.

5. Preparation of year end report on Project 30.

COMMENTS:

This project is congruent with the designated thrust areas from the February, 1995, GCRMTC workshop, in that it is directly about catalyzing change within the maritime industry. The proposed second year of funding is necessary to work with the industry participants and other GCRMTC researchers to implement the model and make iterative changes that will customize the model to individual strategic groups. The model test stage is designed to work with industry participants as they actually implement technological innovations within a firm. For these reasons we have submitted this proposal for the next review session so that the testing of the model can be accomplished. This project was originally planned as a two-year project in order to work with shipbuilding industry participants and insure usability of the research model under field conditions.

COLLABORATIVE EFFORTS	THIS QTR	YTD
$VALUE OF SERVICES FROM INDUSTRY:		
IN KIND SERVICES:	$950.00 *	$20,000.00 *
ACTUAL FUNDS:	–	–
$VALUE OF SERVICES FROM GOVERNMENT:		
INKIND SERVICES:	–	–
ACTUAL FUNDS:	–	–
# OF SIGNIFICANT CONTACTS:		
INDUSTRY:	18**	43**
ACADEMIC:	3	11
GOVERNMENT:	5	7

COMMENTS TO EXPLAIN ABOVE:

* Estimate of value of time donated by firms who made executives available to us for interview and discussion.

** Includes 14 returned surveys. This number will increase greatly during this quarter as the survey responses are returned.

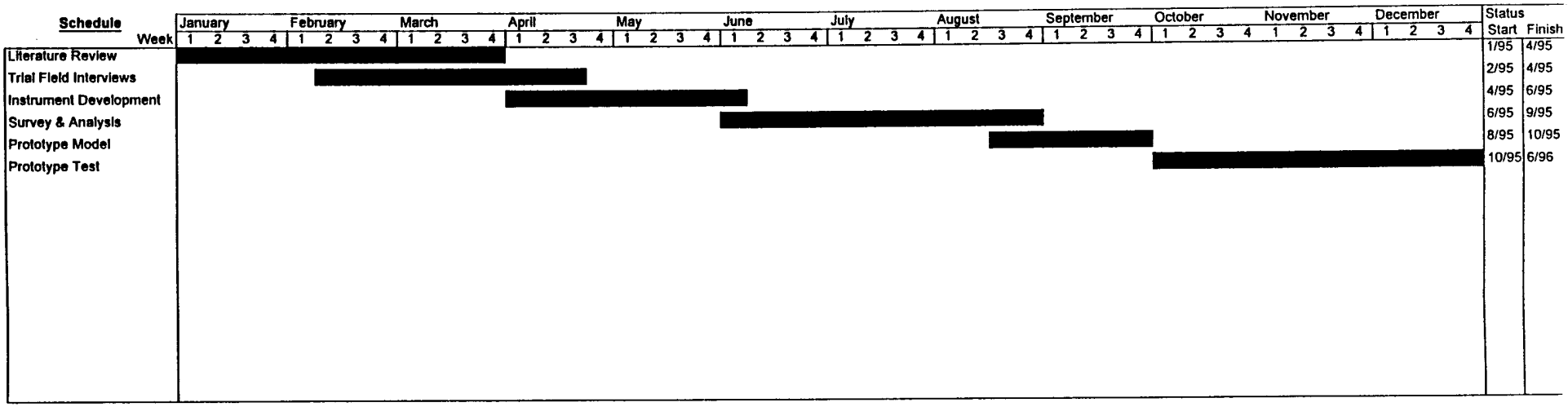
Technology Transfer Index
GCRMTC Project 30

FILENAME	SUBJECT	REFERENCE
shipfinc.txt	SIC Code 3731	CD Disclosure
noship.wk3	NO shipyards	DBER data
ship.wk3	LA shipyards	DBER data
Shipb.ab1	Shipbuilding	ABI Jan 92- Dec 94
Shipb.ab2	Shipbuilding	ABI Jan 87- Dec 92
Shipb.fd1	Shipbuilding	M Archive
Shipb.p1	Shipbuilding	Periodicals Sep 93-Dec 94
Shipb.p2	Shipbuilding	Periodicals Jan 92-Aug 93
Shipy.ab1	Shipyards	ABI Jan 92-Dec 94

Shipy.ab2	Shipyards	ABI Jan 87-Dec 92
Shipy.p1	Shipyards	Periodicals Sep 93-Dec 94
Shipy.p2	Shipyards	Periodicals Jan 92-Aug 93
Shipy.p3	Shipyards	Periodicals Jan 90-Dec 91
Shipy.p4	Shipyards	Periodicals Jan 88-Dec 89
Ships.adr	Shipyards	Shipyard Addresses
Techx.fd1	Technology Transfer	M Archive
Techx.p1	Technology Transfer	Periodicals Sep 93-Dec 94
Techx.p2	Technology Transfer	Periodicals Jan 92-Dec 94
Techx.p3	Technology Transfer	Periodicals Sep 93-Dec 94
Techx.ab1	Technology Transfer And Marketing	ABI Jan 89-Apr 95
Techx.ab2	Technology Transfer And Engineering	ABI Jan 89-Apr 95
Techx.ab3	Technology Transfer	ABI Jan 89-Apr 95
Shiptech.src	Internet Sources	Various
Reports.txt	Project Reports	Project 30

This is an index of the current holdings in the Project 30 data base. They are the result of researching as much information about shipbuilding, shipyards, technology transfer, and related subjects as was available, retaining the best of the information, and recording that information into electronic format. We are also making available any work products of the Project 30 team that could be useful to industry participants. The information is generally available either as a text or common word processing program language, or Lotus format spreadsheet. We are making this available to industry partners and any other interested parties.

Title IMPROVING TECHNOLOGY TRANSFER IN THE SHIPBUILDING INDUSTRY - PROJECT 30



APPENDIX L

DIGITAL IMAGE PHOTOGRAMMETRY

GCRMTC PROJECT NO. AMTC95-035C

Principal Investigator: **Clifford J. Mugnier**
Department of Civil and Environmental Engineering

University of New Orleans
New Orleans, LA 70148

BRIEF SYNOPSIS: A problem in modular shipbuilding is the lack of a reliable and quick method of obtaining and utilizing dimensional control. Photogrammetry has been successfully used as a tool for this application, but because of the large number of systematic errors associated with film-based cameras; only very large shipyards have attempted this. Recently, developments in Charge Coupled Device (CCD) imaging arrays for cameras have allowed some success in applying photogrammetric techniques *without film* in dimensional control. The software and hardware configurations have been expensive and complicated. Digital camera systems and computers will be purchased and programmed to tie existing inexpensive software packages originally designed for mapping into a tool for production shipyard fabrication dimensional control.

BUDGET STATUS:

TOTAL AMOUNT BUDGETED:	$327,017
FUNDS REMAINING	$121,893

ACCOMPLISHMENTS THIS PERIOD:

SECOND QUARTER:

1. Contact has been made with the Defense Technical Information Center (DTIC). An application has been completed by the GCRMTC UNO Site to have a DTIC account number for all researchers. An initial trial query was initiated for Photogrammetry applications in Shipbuilding. The results indicated that there are no existing unclassified documents held by DTIC on that topic or on Digital Theodolites or Laser Interferometers. The Supervisor at DTIC then tried a query for all references to Shipbuilding. The DTIC has a total of less than 300 references to Shipbuilding (unclassified); a hard copy was generated and the GCRMTC now has that bibliography for reference use by all researchers.

2. An Industry Survey has been completed; the following shipyards have participated: Avondale, Charleston Naval, Norfolk Naval, General Dynamics, Newport News, Ingalls, Nassco and Bath Iron Works. Results of the survey are being presented at the SP-8 Workshops in Norfolk (Oct 4-5), New Orleans (Oct 12-13), and San Diego (Oct 23-24).

3. Progress in software development and integration has slowed because of delays in deliveries as well as integration difficulties. Undocumented modifications in the new Kodak cameras now require the purchase of additional Kodak hardware (within budget) for remote control operation of the cameras. Minor purchasing details remain such as carry cases, tripods, attachments, etc. Familiarization with software packages has continued. The cameras are

operational with initial viewing software, some initial software code has been written to capture pixel coordinates for the photogrammetric process. Image quality, in general, is spectacular.

PROPOSED ACTIVITIES NEXT PERIOD:

1. Software development & integration.

2. Creation of Test Procedure Document for field verification of results.

3. Field Implementation.

COLLABORATIVE EFFORTS:

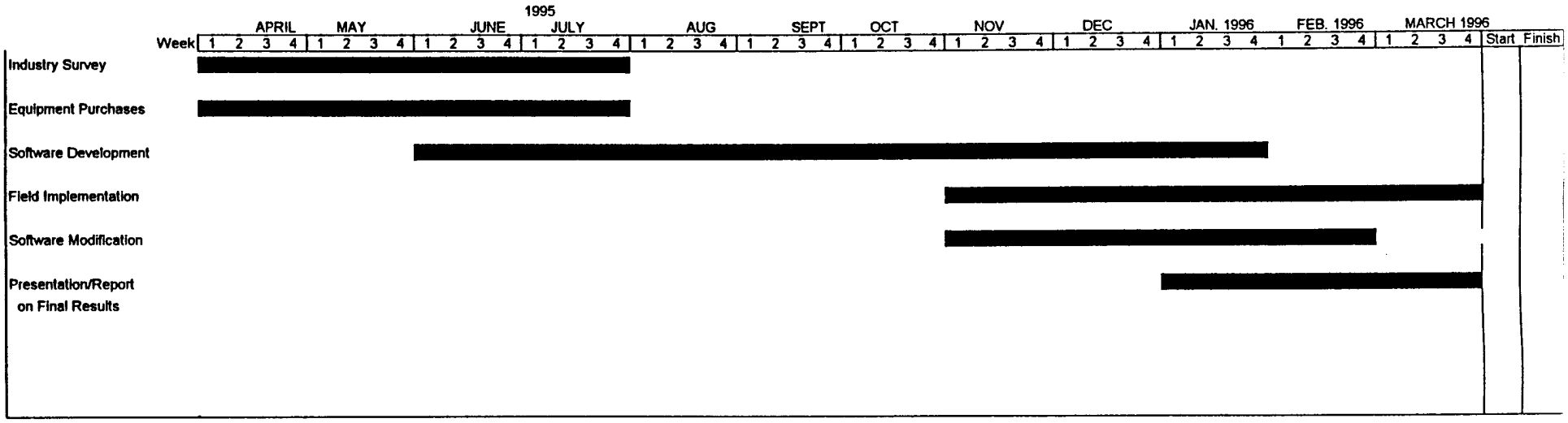
COMMENTS: Initial tours, photo acquisitions and field verifications will begin the fourth week of October with the aid of A.K.Suda & Associates, Inc.

APRIL 1, 1995 START

DIGITAL IMAGE PHOTOGRAMMETRY

GCRMTC PROJECT NO. 35

MUGNIER



APPENDIX M

SHIP CAPSIZING (AN ACCURATE AND EFFICIENT TECHNIQUE TO PREDICT SHIP ROLL DAMPING)

GCRMTC PROJECT NO. AMTC95-036C

Principal Investigator: **Dr. Jeffrey M. Falzarano**
Department of Naval Architecture and Marine Engineering

Additional Researcher: **Dr. Richard A. Korpus**
Marine Hydrodynamics (SAIC, Ship Technology)

University of New Orleans
New Orleans, LA 70148

BRIEF SYNOPSIS: This project will develop an accurate and efficient technique to predict ship roll damping using the Finite Analytic Reynolds Averaged Navier Stokes (FA-RANS) solution technique. This capability will be used to improve naval and commercial hull form design with regards to minimizing the most critical resonant roll motions and loads. The approach to be utilized will be to apply progressively more accurate yet computer intensive approximations. Comparisons will be made with existing and to be obtained model and full scale data. Extensive use will be made of existing SAIC capability and UNO experimental and computer resources including the newly installed UNO Cray J916.

BUDGET STATUS:

TOTAL AMOUNT BUDGETED:	$222,296
FUNDS REMAINING:	$105,848

ACCOMPLISHMENTS THIS PERIOD:

1. The with-bilge keels gridding capability has been successfully developed and tested for a single representative hull form.

2. The unsteady panel method has been developed and applied to a single representative hull form.

3. The development of the fully nonlinear free-surface viscous boundary condition including no-shear stress on the surface is continuing.

4. A frequency and amplitude variation of a single representative hull form has been completed.

5. Meetings have been held with Mr. Mukerjee (Chief Naval Architect of McDermott Offshore). His input was obtained on a useful range of some of the parameters, and discussions were held regarding McDermott's participation in this project.

6. Another student, Mr. Z. Zhong from Shanghai Shoa Tung University in China, was hired to work on this project. He is an excellent student and should be able to contribute to this project.

PROPOSED ACTIVITIES NEXT PERIOD:

1. Complete 2-D Free-surface boundary condition development. As per the suggestion of P. Mukerjee, for the 2-D with a free-surface case, we will produce a wallsided with bilge radius

systematic series. The following six parameters will be varied: a) Beam/Draft, b) bilge radius/Draft, c) motion frequency, d) roll center (roll and sway), e) bilge keel size, and f) motion amplitude.

2. An automated procedure will be developed to utilize the results of the RANS and unsteady ideal flow codes in order to derive the viscous contribution to the roll damping. These results will be useful to naval architects using potential flow computer programs to better predict the roll damping and vessel response.

3. We are on schedule with regards to the 2-D without a free surface development tasks (see attached time line). The 2-D with a free-surface and development of a systematic series represent slight deviations from the original plan but this will facilitate more efficient completion of future tasks and make the results more widely available and practically useful.

COLLABORATIVE EFFORTS:

$ VALUES OF SERVICES FROM INDUSTRY:

IN KIND Cray C-90 time from SAIC:	40 hrs @ $400 per hr	$16,000
Cray C-90 time from Cray Research:	100 hrs @ $400 per hr	$40,000

ACTUAL FUNDS (none)

$ VALUES OF SERVICE FROM GOVERNMENT:

IN KIND (none)
ACTUAL FUNDS (none)

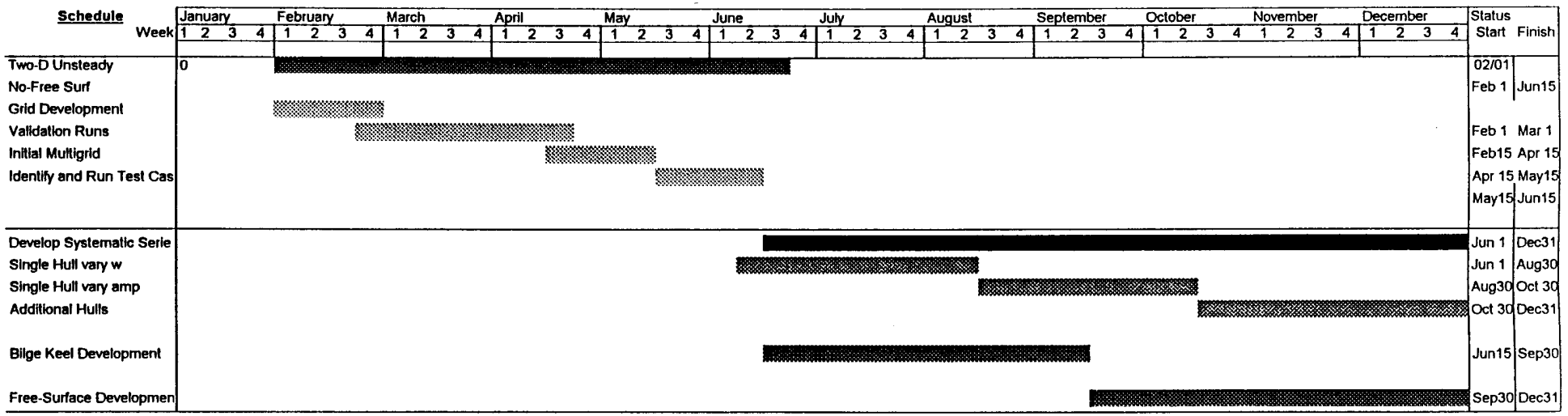
OF SIGNIFICANT CONTACTS:

INDUSTRY: Mr. Mukerjee (McDermott Offshore), T. Kokinias (Exxon PR)
ACADEMIC: Prof. Yeung (UC Berkley), Prof. Cheung (Univ. of Hong Kong)
GOVERNMENT: H. Chatterton (NAVSEA), B. McCrieght (DTRC)

COMMENTS:
Additional information regarding meetings and discussions with Mr. Mukerjee:

1. One of Mr. Mukerjee's staff naval architects will use the developed capability to predict the roll damping of one of McDermott's semi-submersible crane vessels to compare that with available model test results.

Ship Capsizing (An Accurate & Efficient Technique to Predict Ship Roll Damping)



APPENDIX N

MOTION SICKNESS AND ANTI-MOTION SICKNESS TREATMENT

GCRMTC PROJECT NO. AMTC95-099C

Principal Investigator: **Thomas G. Dobie**
Department of Psychology

Additional Researcher: **James G. May**
Department of Psychology

University of New Orleans
New Orleans, LA 70148

PROJECT SYNOPSIS: Motion sickness and related illness impair performance of Navy personnel and often result in a complete inability to carry out an assigned task. *Naval Medical Information Management Center* data from a recent fifteen month period show that, on ships ranging from nuclear-powered aircraft carriers to repair ships, enlisted men incapacitated due to motion sickness cost the Navy $135,000.00 in lost man days. This does not include additional costs of medication and medical monitoring. Motion-produced vestibular stimulation also greatly affects sleep, often inducing severe fatigue which is a concern for sustained operations. To remedy these and other problems, the current project is aimed at validating a cognitive-behavioral anti-motion sickness training program developed at the Naval Biodynamics Laboratory by Dr. Thomas G. Dobie.

Our primary goal is to offer an intervention and management strategy for U.S. Navy personnel exposed to motion environments. Validation involves training others to employ the technique and testing their ability to use it. Upon validation of the cognitive-behavioral program, we will begin to transition the technique to an appropriate field operational setting through the use of Technology Transfer channels. A secondary goal is to develop predictors of motion sickness that might be used in personnel selection.

BUDGET STATUS:

TOTOAL AMOUNT BUDGETED:	$100,000
FUNDS REMAINING:	$$91,000

Note: Due to the time required to receive a work permit ("green card"), Dobie's arrival was delayed. A no-cost six month's extension to the contract has been received.

ACCOMPLISHMENTS THIS PERIOD:

1. Develop Training Program for CBMT Trainers:

Work has continued on the preparation of a "Handbook of Cognitive-Behavioral Training", for use by trainers. NBDL is presently taking advice on the final format required by the Navy. In addition, consideration is being given to preparing two documents. A reference manual on motion sickness and its management, plus a slimmed down version of the handbook. Further references are being summarized for the reference document.
A suitable site has been identified at UNO for the location of the new mechanical desensitization training device. However it has been decided to delay the transfer until further acceptance checks have been completed on-site at NBDL.

2. Assist in Technology Transfer of the CBMT Program:

Following the visit to the LCAC community reported last quarter, difficulties have emerged in terms of releasing LCAC personnel. Because of the nature of their crew structure, it is impractical to release individual crew members without disrupting the whole crew. For that reason the navy decided that it was not a suitable location for the initial validation study.
However, a patrol craft unit on the west coast which has severe problems with motion sickness has now been identified. Preliminary discussions between NBDL and that unit suggest that motion sickness sufferers will be made available for cognitive- behavioral training.

A meeting took place at NAMRL to discuss the treatment of trainee aviators, at Whiting Field, who are suffering from airsickness. At present they are transferred to Pensacola for biofeedback training. This training is taking longer than expected and creating some problems with the flight training program at Whiting Field. We await the outcome of discussions between Whiting Field and NAMI/NAMRL, Pensacola, concerning future treatment plans and what contribution we can make. We have been invited to attend a second meeting at Pensacola; probably in early November.

3. Assist in Construction of a Selection Tool on Motion Sickness

We are continuing to review the problems found by NBDL during the joint International CANUKUS studies (Canadian, United Kingdom, United States), on the SMS with the Human Factors Group at NBDL. The review of literature on this matter continues and we will remain in touch with European and American psychologists in this field.

Since last quarter, the Dutch scientists who are collaborating with the CANUKUS group have run into serious motion sickness problems associated with head movements on their ship motion simulator in the Netherlands, even though it has a very limited heave capability.

As far as an evoked potential index of motion sickness is concerned, we are standing by to review any results forwarded by NBDL; as yet, none have been received.

4. Personality:

This project continues as a literature survey to obtain existing information on the relationship between motion sickness and personality profiles prior to carrying out investigative trials. In addition NBDL is now advising on their input into this, based on previous work carried out by one of their aviation psychologists. We shall then select an updated putative battery for use with the questionnaire study with the aviators from Whiting Field and other Navy and Coast guard personnel.

PROPOSED ACTIVITIES NEXT PERIOD

1. We hope to be in position to begin data collection and field testing of the cognitive-behavioral technique by November. We shall be training severely motion sick subjects from a west coast patrol craft unit. These initial validation studies will be carried out on the fixed base desensitization chair at NBDL. Initial contacts with the patrol craft community have indicated that they may be willing to send five subjects to NBDL for this purpose. In the meantime work will continue on acceptance trials on the mobile desensitization chair.

If we can finalize the updated putative battery of personality tests to be used in evaluating the relationship between those variables and motion sickness susceptibility they will be used in conjunction with the training of the patrol craft subjects..

2. We still hope to train 5 navy counselors in the use of cognitive-behavioral treatment including the use of the rotating/tilting desensitization chair, however, the Navy has not yet identified those candidates.

3. We will also complete the handbook on cognitive-behavioral counseling. In addition, work will proceed immediately with the reference volume on motion sickness, if the Navy state that requirement.

4. We will complete the literature review on motion sickness and screen the updated putative personality tests for test-retest reliability, as soon as they are received from NBDL.

5. We hope to finalize a contract with Glaxo Wellcome Inc. To carry out an evaluation on the effectiveness of "ondasetron" as an anti-motion sickness drug. This is an FDA approved anti-emetic used to control nausea and vomiting induced during cancer therapy. The trials will take place at NBDL using the ship motion simulator. The PI for this proposed study will be James G. May, and Thomas G. Dobie will be the experimenter.

COLLABORATIVE EFFORTS THIS QTR YTD

$ VALUES OF SERVICES FROM INDUSTRY:
IN KIND SERVICES:
ACTUAL FUNDS:

$ VALUES OF SERVICES FROM GOVERNMENT:
IN KIND SERVICES:
ACTUAL FUNDS:

OF SIGNIFICANT CONTACTS:

INDUSTRY: Glaxo Wellcome Inc.; Smooth Sailing
ACADEMIC: United Kingdom Medical Research Council, psychologists and human

factors researchers.

GOVERNMENT: International CANUKUS (Canadian, United Kingdom, United States) Human Factors research group. NAMI/NAMRL, USN Pensacola; Landing Craft Air Cushion (LCAC) Squadron, Norfolk Va.

COMMENTS:

Regarding contacts with industry, we are currently negotiating a contract with Glaxo Wellcome to carry out a drug study. We have also been contacted by Smooth Sailing Co. with a view to evaluating a beverage they market as a motion sickness preventive. A preliminary meeting has been scheduled for 3 November.

Motion Sickness and Anti-Motion Sickness Treatment

Schedule	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Status
Week	1234	1234	1234	1234	1234	1234	1234	1234	1234	1234	1234	1234	S/F
Task 1													2/95 12/95
Task 2													7/95 12/95
Task 3													3/95 12/95
Task 4													4/95 12/95

Task #1: Develop Training Program for CBMT Trainers
Task #2: Assist in Technology Transfer of the CBMT Program
Task #3: Assist in Construction of a Selection Tool on Motion Sickness
Task #4: Personality

APPENDIX O

ORANGE SITE HARDWARE AND SOFTWARE PROCUREMENTS

Lamar University
Beaumont, Texas 77630

GCRMTC-Lamar University Site
Hardware and Software Budget Status

	Vendor	Item	Quantity	Actual Cost	Projected Cost	DoP	Retail Price	Contribution
Computer Systems/Peripherals	Silicon Graphics	SGI ONYX	1	$ 1,047,694.25	$ 1,051,550.00	2/28/95	$ 1,632,598.80	$ 584,904.55
	Silicon Graphics	SGI Indigo 2 Extreme & Periph.	3	$ 83,272.00	$ 91,147.00	2/28/95	$ 127,030.00	$ 43,758.00
	Silicon Graphics	SGI Indigo 2 XZ	1	$ 19,510.50	$ 22,135.00	2/28/95	$ 26,338.97	$ 6,828.47
	Silicon Graphics	SGI Indy's	4	$ 40,189.50	$ 50,689.50	3/6/95	$ 76,380.00	$ 36,190.50
	Silicon Graphics	SGI Indy (DNS Server)	1	$ 6,021.50		3/28/95	$ 8,495.00	$ 2,473.50
	Silicon Graphics	RAID System	1	$ 44,470.75		11/28/94	$ 73,033.00	$ 28,562.25
	Dell Marketing	Pentium Notebook	2	$ 11,184.00		7/21/95	$ 11,184.00	$ -
	AVC3	3D Projection System		$ 121,862.28	$ 200,000.00	3/27/95	$ 121,862.28	$ -
	Fakespace	BOOM 3C	1	$ 111,900.00	$ 150,000.00	3/9/95 3/30/95	$ 146,234.74	$ 34,334.74
	Division, Inc.	HMD/Tracker/Controller	1	$ 25,084.69		7/19/95	$ 28,825.94	$ 3,741.25
	Engineered Comp. Rooms	UPS for ONYX , W.S. and Rack		$ 19,950.00	$ 17,000.00	3/17/95	$ 23,940.00	$ 3,990.00
	Hewlett Packard	HP Computers	2	$ 59,663.70		7/19/95	$ 93,745.00	$ 34,081.30
	Hewlett Packard	Disk Storage Device	1	$ 11,275.00		7/19/95	$ 14,093.75	$ 2,818.75
	Digital Comp. Associates	RAM for HP's	1	$ 19,580.00		7/19/95	$ 25,728.00	$ 6,148.00
	Sequel Data Systems	DEC Alpha Workstations	2	$ 17,299.60		8/5/95	$ 20,759.52	$ 3,459.92
Hardware Total				$ 1,638,957.77			$ 2,430,249.00	$ 791,291.23
Networking Components	Southwestern Bell	Internal Cabling		$ 20,189.95	$ 50,000.00	3/27/95	$ 20,189.95	$ -
	Fore Systems	Network Hardware		$ 92,268.35	$ 95,000.00	3/27/95	$ 110,722.02	$ 18,453.67
	Fore Systems	Network Hardware	1	$ 1,736.00		6/15/95	$ 2,083.20	$ 347.20
	Fore Systems	Network Hardware	1	$ 4,182.98		6/21/95	$ 5,019.58	$ 836.60
	Southwestern Bell	Internet T-1 Line Org-Bmt 5 mo.		$ 4,819.30		3/27/95	$ 4,819.30	$ -
	MCI	Internet T-1 Line Bmt-Hst 5 mo.		$ 5,105.00		3/27/95	$ 5,105.00	$ -
	Southwestern Bell	Internet T-1 Line Hst-MDA 5 mo.		$ 3,368.50		3/27/95	$ 3,368.50	$ -
	Univ. of Texas @ Austin	THEnet Fee thru August		$ 500.00		3/27/95	$ 500.00	$ -
	Anixter Bros.	Larsecom CSU/DSU	2	$ 4,410.00		3/24/95	$ 5,292.00	$ 882.00
	Anixter Bros.	Cabling Supplies		$ 546.00		3/28/95	$ 655.20	$ 109.20
	Anixter Bros.	Cabling Supplies		$ 3,380.00		3/30/95	$ 4,056.00	$ 676.00
	Anixter Bros.	Hubs and Cables		$ 2,444.00		4/20/95	$ 2,932.80	$ 488.80
	Larsecom, Inc.	Cables		$ 153.25		5/9/95	$ 183.90	$ 30.65
	Sabre' Data	Cisco 2511 & Periph.		$ 4,474.54		3/27/95	$ 5,369.45	$ 894.91
	Sabre' Data	Modems for Network	4	$ 2,747.10		7/11/95	$ 3,296.52	$ 549.42
	Sabre' Data	Octopus Cables	2	$ 515.58		3/31/95	$ 618.70	$ 103.12
	Computer Dimensions	Transciever for MAC's	2	$ 138.00		6/19/95	$ 138.00	$ -
	Computer Dimensions	Cable for MAC to VGA	1	$ 49.99		6/19/95	$ 49.99	$ -

GCRMTC-Lamar University Site
Hardware and Software Budget Status

	Vendor	Item	Quantity	Actual Cost	Projected Cost	DoP	Retail Price	Contribution
	AVC3	Add'l. RGB Cable for HMD	1	$ 1,345.00		8/3/95	$ 1,345.00	$ -
Network Total				$ 152,373.54			$ 175,745.10	$ 23,371.56
SOFTWARE		CAD Software			$ 150,000.00			
	Silicon Graphics	IRIS Varsity Program	1	$ 10,975.00		4/17/95	$ 10,975.00	$ -
	Engineering Cybernetics	ADAMS Package	1	$ 36,432.00		8/14/95	$ 43,718.40	$ 7,286.40
	Engineering Cybernetics	ANSYS Package	1	$ 24,200.00		8/14/95	$ 29,040.00	$ 4,840.00
	Division, Inc.	dVISE Software	2	$ 12,187.50		7/19/95	$ 43,387.50	$ 31,200.00
	Parametric Technology	ProEngineer Software	2	$ 29,400.00		7/21/95	$ 38,220.00	$ 8,820.00
	Proteus Engineering	FastShip Software DOS&UNIX	2	$ 11,000.00		5/8/95	$ 19,800.00	$ 8,800.00
	Sequel Data Systems	DEC Software	1	$ 2,188.80		5/8/95	$ 2,626.56	$ 437.76
	Engineering Animation	VisLab	1	$ 16,200.00		8/14/95	$ 19,400.00	$ 3,200.00
	Fluid Dynamics	FIDAP	1	$ 19,200.00		8/16/95	$ 19,200.00	$ -
	MSC	Nastran/Patran	1					$ -
	??	CAD	1					$ -
	Vivid Technologies	Polyform Software	1	$ 299.00		9/7/95	$ 299.00	$ -
Software Total				$ 162,082.30			$ 226,666.46	$ 64,584.16
Miscellaneous					$ 60,000.00			
	Vinay Saxena	Tape for backup @ training	1	$ 18.99		4/27/95	$ 18.99	$ -
	VanStar	WYSE ASCII Terminals	2	$ 658.25		6/15/95	$ 789.90	$ 131.65
	VanStar	Ethernet & SCSI Cards	1	$ 664.25		9/7/95	$ 797.10	$ 132.85
	VanStar	Backup Tapes	24	$ 308.30		6/15/95	$ 369.96	$ 61.66
	VanStar	Backup Tapes	90	$ 683.50		8/23/95	$ 820.20	$ 136.70
	Sabre'Data	Cisco Configuration Builder	1	$ 495.00		6/15/95	$ 594.00	$ 99.00
	Falcon Systems	Second Hard Drives for Indy's	4	$ 4,524.00		6/15/95	$ 5,428.80	$ 904.80
	Specialized Products	Toolkit	1	$ 949.16		6/15/95	$ 1,138.99	$ 189.83
	AVC3	RGB & Keyboard cabling	1	$ 1,122.50		9/22/95	$ 1,347.00	$ 224.50
	Silicon Graphics	SGI CBT Training		$ 10,444.50		3/28/95	$ 10,444.50	$ -
	Silicon Graphics	SGI Training Off-site		$ 12,025.00		3/10/95	$ 12,025.00	$ -
	Silicon Graphics	SGI Training (ONYX Maint.)	1	$ 5,595.00		7/10/95	$ 5,595.00	$ -
	Hewlett Packard	System Management Training	4	$ 6,340.00		7/19/95	$ 6,340.00	$ -
	Division, Inc.	dVISE Training	2	$ 9,000.00		7/19/95	$ 9,000.00	$ -
	Engineering Animation	VisLab Training	2	$ 1,000.00		8/14/95	$ 1,000.00	$ -
	Fluid Dynamics	FIDAP Training	2	$ 2,400.00		8/14/95	$ 2,400.00	$ -
	MAC Warehouse	Cables	1	$ 22.95		8/29/95	$ 22.95	$ -
	Parametric Technolgies	Pro/Engineer Training	2	$ 3,000.00			$ 3,000.00	$ -
Miscellaneous Total				$ 59,251.40			$ 61,132.39	$ 1,880.99
Grand Total		Total		$ 2,012,665.01			$ 2,893,792.95	$ 881,127.94
		Total Allocated 8/94-9/95		$ 2,216,338.00				
		Remaining Balance		$ 203,672.99				

GCRMTC-Lamar University Site
Hardware and Software Budget Status

	Vendor	Item	Quantity	Actual Cost	Projected Cost	DoP	Retail Price	Contribution
	Purchase priorities with remaining balance:			1. MSC Nastran				
				2. CFD Software				
				3. AutoCAD				
				4. SGI Power Chg.				

APPENDIX P

A PROGRAM FOR MONITORING CPU USAGE IN A DISTRIBUTED COMPUTER SYSTEM NETWORK

GCRMTC PROJECT NO. OR95-004D

Principal Investigator: **Lawrence Osborne**
Department of Computer Science

Lamar University
Beaumont, Texas 77630

PROJECT SYNOPSIS:

This goal of the proposal is for the creation of software that will monitor the CPU usage of a network of UNIX workstations for the purpose of billing users of the system. The collected data will be transmitted to a PC server running Windows/Windows NT, which will organize the information and create reports that can be used by the center's staff. The software will be designed according to the client-server model. Demon processes will run in the background on each UNIX workstation. These deamons will monitor the amount of execution time utilized by each member of the group of remote clients each time a login by one of the members occurs. The primary means of calculating CPU usage will be system calls to the individual workstation kernels. Since the client workstations are running in the UNIX environment and the server will be in Windows environment, it will be necessary to develop an integrated environment in which the primary interface for communications will be general enough that other applications such as database servers can easily be developed by extending the ideas employed in this project.

One major issue in porting applications from a Berkeley sockets environment to a machine running Windows involves the "blocking" of processes that are awaiting a reply from one or more other processes. The default behavior within the UNIX sockets model is for a socket to block unless the programmer explicitly requests that operations be treated as non-blocking. Since UNIX is a multiprogramming system, other processes can continue even if one process does block. However, on PCs only one processes can continue even if one process does block. However, on PCs only one process can execute at a time. Hence if blocking occurs no other processing can be done until the expected reply arrives. Thus it is necessary to use asynchronous operations if at all possible, since they work much better within the nonpreemptive Windows environment

BUDGET STATUS:

TOTAL AMOUNT BUDGETED:	$7,328.70
FUNDS REMAINING:	$7,328.70

ACCOMPLISHMENTS THIS PERIOD:

1. Data structures for both client and server defined for transferring data back and forth.

2. Data structure to monitor the core resources of the systems (kernel memory/CPU time/Application usage).

3. Front end of the graphics has been conceptualized and programming for that has been started.

4. A skeleton deamon has been written to monitor logins and process forked by the shell process at this point of time and further work is underway.

PROPOSED ACTIVITIES NEXT PERIOD:

I expect to have some major work accomplished in the next three-four weeks, and then in last week of December we will begin our work on porting the server software for different flavors of UNIX (DEC OSF/HP-UX/SunOS).

APPENDIX Q

GULF COPPER MANUFACTURING CORPORATION BUSINESS PROCESS IMPROVEMENT PROJECT

GCRMTC PROJECT NO. OR95-001A

Principal Investigator: **Patricia Pate**
Gulf Coast Region Maritime Technology Center

Lamar University
Beaumont, Texas 77630

PROJECT SYNOPSIS:

The focus of this project is to improve turn-around time on ship repair projects. Key issues include improving throughput of repair/conversions, assessing the organizational environment/culture, team activities and current quality initiatives. Using simulation software, baseline process models will be developed which characterize the current approach to the bid process, planning, materials acquisition, and project management. The Stolt Parcel Tank Modification Project was chosen as the project on which the Project Team would focus. Data will be gathered through various means, including interviews, surveys, and group work-sessions, as appropriate to the situation. Once current practices are modeled, "what if" scenarios will be simulated to demonstrate potential opportunities for improvement for the organization.

BUDGET STATUS:

TOTAL AMOUNT BUDGETED:	$134,719
FUNDS REMAINING:	$37,021

ACCOMPLISHMENTS THIS PERIOD:

1. Project team continued to meet, gather data and develop a baseline model and description of current practices for subsequent use in simulating Gulf Copper's processes.

2. Project team members were invited to attend and observe a preliminary meeting between Stolt Parcel and GCMC personnel regarding plans for the pending tank modification/placement process.

3. Members of the project team went aboard the Stolt ship and observed as GCMC crews further modified and placed cargo tanks on the Stolt tanker. Informal discussions with GCMC staff, the Captain and other Stolt personnel were held in conjunction with this day's activities. Stolt Captain in charge of tank project welcomed Project Team's involvement and questions.

4. An individual project team member held a follow-up meeting with Gulf Copper personnel to collect additional information following the Stolt tank project.

5. A meeting with Gulf Copper's customer, Stolt Parcel, and their top management to discuss the completion of the tank modification project is pending.

PROPOSED ACTIVITIES NEXT PERIOD:

1. Confirm meeting with Gulf Copper customer, Stolt Parcel, to discuss their perception of how the recent tank modification job was managed and the overall quality of work and services provided by Gulf Copper crews. Intend to gain insight into continued/growing needs of Stolt.

2. Project team member(s) to attend training on Sim++ (computer simulation software) to be held at the Gulf Coast Region Maritime Technology Center.

3. Baseline model of current processes to be simulated utilizing simulation software.

4. A graduate engineering student will be hired to assist with process simulations.

APPENDIX R

JAPANESE CIMS TRANSLATION PROJECT

GCRMTC PROJECT NO. OR95-003C

Principal Investigator: **Bruce Bongiorni**
Gulf Coast Region Maritime Technology Center

Lamar University
Beaumont, Texas 77630

PROJECT SYNOPSIS:

The focus of this project is to translate the Japanese CIMS document provided to the Center by ARPA for eventual delivery to both the SP-4 Panel and ARPA.

BUDGET STATUS:

TOTAL AMOUNT BUDGETED:	$15,203
FUNDS REMAINING:	$11,727

ACCOMPLISHMENTS THIS PERIOD:

A draft of the translated document has been edited for grammar, style, prose, content, and flow. Also, the draft document was submitted to Dick Moore of the University of Michigan for review and comments.

PROPOSED ACTIVITIES NEXT PERIOD:

A desktop version incorporating Dick Moore's comments will be published and disseminated to the SP-4 Panel and ARPA.

APPENDIX S

TEXAS GULF COAST REGIONAL SHIP REPAIR MARKET ANALYSIS

GCRMTC PROJECT NO. OR95-002B

Principal Investigator: **Roy Huckaby**
Gulf Coast Region Maritime Technology Center

Lamar University
Beaumont, Texas 77630

PROJECT SYNOPSIS:

The proposed research is for an extensive analysis of the ship-repair market. In addition to providing planning data for Texas Gulf Coast firms, the research will also serve as a model for similar research in other parts of the U.S. By identifying the number and type of potential customers, the factors that will make U.S. shipyards competitive with respect to both cost and time, and the factors that enter into selection of repair firms, this research will permit U.S. shipyards to become proactive in developing business. A strategic advantage will ensue. Through a more aggressive marketing of their services, shipyards should become stronger and provide a greater number of permanent jobs for U.S. citizens.

BUDGET STATUS:

TOTAL AMOUNT BUDGETED:	$132,171
FUNDS REMAINING:	$81,893

ACCOMPLISHMENTS THIS PERIOD:

1. Pertinent publication documents from trade association, government and private source have been obtained and received. Information has been organized for background information to be included in the project completion report.

2. First draft of the completed report has been initiated.

3. We have made contact with local port authorities to identify shipping firms utilizing the waterways of the Texas Gulf Coast.

4. The mail survey instrument has been completed to send to local marine ship repair firms.

5. A list of shipping lines and appropriate contacts in those shipping lines has been developed for future mail and personal interviews.

PROPOSED ACTIVITIES NEXT PERIOD:

1. Continued refinement and edit of report.

2. Contact with both repair companies and shipping lines will continue.

3. Data from the mail survey and personal interview will be edited, organized and analyzed.

4. The project will be completed.

COLLABORATIVE EFFORTS:	THIS QTR	YTD
$ Values of Services from Industry:		
In Kind Services:	-0-	-0-
Actual Funds:	-0-	-0-
$ Values of Services from Government:		
In Kind Services:	-0-	-0-
Actual Funds:	-0-	-0-
# Of Significant Contacts:		
Industry:	29	29
Academic:	5	5
Government:	2	2

COMMENTS: (to amplify, explain, or add to the above)

Project is proceeding on schedule. Completion is expected as projected on December 15, 1995.

APPENDIX T

MARKETING RESOURCE CENTER FEASIBILITY STUDY

GCRMTC PROJECT NO. OR95-005A

Principal Investigator: **H. B. Bongiorni/H. M. Bunch**
Gulf Coast Region Maritime Technology Center

Lamar University
Beaumont, Texas 77630

PROJECT SYNOPSIS:

The GCRMTC-Lamar University Site Statement of Work requires that we "investigate the feasibility of establishing and operating a market analysis and strategic international marketing center, in cooperation with the US Department of State and the US Maritime Administration, for international commercial shipbuilding sales, including development of curriculum and other materials which can be utilized by the shipbuilding industry."

The objective of the study will be to determine the feasibility of a market analysis and strategic international marketing center for commercial shipbuilding and repair. The center would (1) provide basic marketing data, (2) provide analysis of this data for market identification, (3) prepare training for market analysis, and (4) conduct seminars and colloquia for strategic issues relating to market identification and exploitation.

The study plan has five phases:
Project Planning
Literature Research and Information Gathering
Data Analysis and Concept Evaluations
Report Preparation
Sponsor Presentations

BUDGET STATUS:

TOTAL AMOUNT BUDGETED:	$134,190
FUNDS REMAINING:	$133,000

ACCOMPLISHMENTS THIS PERIOD:

1. We have retained Professor Howard M. Bunch to lead in development and execution of the feasibility study.
2. We have defined the project scope, identified tasks, and developed timelines.
3. We have identified and assigned specific resources to accomplish the project tasks.

PROPOSED ACTIVITIES NEXT PERIOD:

1. We plan to identify and evaluate marketing center concepts.
2. We will establish our information needs framework.
3. We will develop our literature search plan and information sources.