

SHIP PRODUCTION COMMITTEE  
FACILITIES AND ENVIRONMENTAL EFFECTS  
SURFACE PREPARATION AND COATINGS  
DESIGN/PRODUCTION INTEGRATION  
HUMAN RESOURCE INNOVATION  
MARINE INDUSTRY STANDARDS  
WELDING  
INDUSTRIAL ENGINEERING  
EDUCATION AND TRAINING

September 1982  
NSRP 0009

# **THE NATIONAL SHIPBUILDING RESEARCH PROGRAM**

## **Proceedings of the IREAPS Technical Symposium**

### **Paper No. 31: The Five-Year National Shipbuilding Productivity Improvement Plan**

U.S. DEPARTMENT OF THE NAVY  
CARDEROCK DIVISION,  
NAVAL SURFACE WARFARE CENTER

# Report Documentation Page

*Form Approved*  
*OMB No. 0704-0188*

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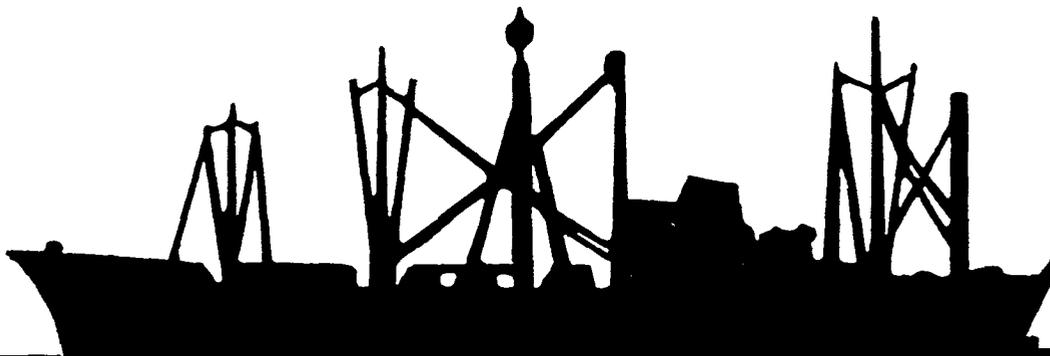
1. REPORT DATE <b>SEP 1982</b>	2. REPORT TYPE <b>N/A</b>	3. DATES COVERED <b>-</b>	
4. TITLE AND SUBTITLE <b>The National Shipbuilding Research Program, Proceedings of the IREAPS Technical Symposium Paper No. 31: The Five-Year National Shipbuilding Productivity Improvement Plan</b>		5a. CONTRACT NUMBER	
		5b. GRANT NUMBER	
		5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)		5d. PROJECT NUMBER	
		5e. TASK NUMBER	
		5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) <b>Naval Surface Warfare Center CD Code 2230 - Design Integration Tools Building 192 Room 128-9500 MacArthur Blvd Bethesda, MD 20817-5700</b>		8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)		10. SPONSOR/MONITOR'S ACRONYM(S)	
		11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT <b>Approved for public release, distribution unlimited</b>			
13. SUPPLEMENTARY NOTES			
14. ABSTRACT			
15. SUBJECT TERMS			
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT
a. REPORT <b>unclassified</b>	b. ABSTRACT <b>unclassified</b>	c. THIS PAGE <b>unclassified</b>	<b>SAR</b>
			18. NUMBER OF PAGES <b>23</b>
			19a. NAME OF RESPONSIBLE PERSON

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**Proceedings**  
**IREAPS Technical Symposium**  
**September 14-16-1982**  
**San Diego, California**

**VOLUME I**



**INSTITUTE FOR RESEARCH AND ENGINEERING FOR AUTOMATION AND PRODUCTIVITY IN SHIPBUILDING**

**I R E A P S**

**THE FIVE-YEAR NATIONAL SHIPBUILDING PRODUCTIVITY IMPROVEMENT PLAN**

**Edmund R. Bangs  
Executive Director  
Institute for Research and Engineering for Automation  
and Productivity in Shipbuilding (IREAPS)  
IIT Research Institute  
Chicago, Illinois**

During the past year Mr. Bangs has led the IREAPS organization in supporting the member shipyards. The highlights of the program year have included, two workshops performed at shipyards in CAD/CAM and computer aided estimating, initiation of the CAD/CAM shipyard, the publication of IREAPS and SPC membership directories and the production of another technical symposium with record attendance.

Most notable in the past year has been his chairman role in the development of "The Five-Year National shipbuilding Productivity Improvement Plan".

Mr. Bangs has a diverse background in shipbuilding technology. He was previously employed by the Electric Boat Division of General Dynamics as a nuclear welding engineer. He was the third generation in his family to work in a shipyard. His responsibilities involved the installation of the S5W nuclear reactor piping and pressure vessel systems in submarines which required his direct involvement with all shipyard production groups and problems. He was trained in nondestructive testing, shipbuilding overhaul programs, and nuclear power plant operation. While he has not in the past been directly involved with the REAPS Program, he has been a consultant to the Program. He has been active in manufacturing technology transfer function for the industrial sector and is familiar with many technology areas presently of interest to the shipbuilding industry.

Formerly the Director of the NASA Manufacturing Applications Team at IITRI, he has been involved in the solutions of industry problems with aero-space technology. His most notable shipbuilding related activity in the NASA assignment was the transfer of technology to the marine transport industry. Other application areas have included laser technology, welding systems, CAD/CAM (Air Force-ICAM) and robotics.

## **ABSTRACT**

**The presentation highlights the efforts of 43 management representatives from 15 of the country's major shipyards who have applied themselves in an organized team effort to develop a national shipbuilding productivity improvement plan. The plan identifies the systems and technology required to improve shipyard productivity. Organizations involved included SPC, IREAPS, NAVY, MARAD, MRB, and the Shipbuilding Council of America.**

## **PROBLEM**

**INDUSTRY CURRENTLY IN WORST  
ECONOMIC SLUMP.**

- DECLINE IN COMMERCIAL ORDERS**
- ECONOMY**
- HIGH BUILDING COSTS**
- DWINDLING PRODUCTIVITY**

## **CHALLENGE**

- SUPPORT NAVY EXPANDED SHIP  
CONSTRUCTION PROGRAM**
- REGAIN LEADERSHIP IN WORLD  
MARKET PLACE,**
- IMPROVE PRODUCTIVITY WITH  
AN ACCELERATED EFFORT**

## CORRECTIVE ACTION

### DEVELOP A NATIONAL E-YEAR PRODUCTIVITY IMPROVEMENT PLAN

- ORGANIZE STEERING COMMITTEE
- CREATE PLAN FRAME WORK
- IDENTIFY PROBLEMS THAT IMPEDE PRODUCTIVITY/  
INCREASE COSTS
- PROPOSE PROBLEM SOLUTIONS - R&D PROGRAM
- ANTICIPATED BENEFITS
- RECOMMEND FUNDING AND IMPLEMENTATION SYSTEMS
- SHIPYARD AND GOVERNMENT AGENCY ENDORSEMENTS

### SCHEDULED COMPLETION

**STEERING COMMITTEE**

**TASK GROUP DIAGRAM**

FIGURE IV-1

**NATIONAL SHIPBUILDING  
PRODUCTIVITY IMPROVEMENT PLAN  
INDUSTRY PARTICIPATION**

TASK GROUPS	AVONDALE	BATH IRON	BETHLEHEM	E. B.	INGALLS	LEIVINGSTON	McDERMOTT	NAVSEA	NASSCO	NNS	NORFOLK	PETERSON	TACOMA	TODD	COLLINGWOOD	OTHER*
ENGINEERING	•		•				•	•	•			•	•			
MFG. TECHNOLOGY	•		•					•	•				•	•		
BUSINESS ENVIRONMENT			•		•											•
MATERIAL HANDLING	•		•	•				•			•					
MATERIAL MANAGEMENT	•	•	•					•					•			
HUMAN RESOURCES			•				•									•
Q. A.	•		•						•			•	•			

\* OTHER:

- J. J. HENRY
- INT'L. BROTHERHOOD OF BOILERMAKERS
- MARITIME ADMINISTRATION
- MARITIME TRANSPORTATION RESEARCH BOARD
- J. J. McMULLEN
- SHIPBUILDERS COUNCIL OF AMERICA
- UNIVERSITY OF MICHIGAN
- UNIVERSITY OF NOTRE DAME

## PLAN OBJECTIVES

- REDUCE DIRECT LABOR MANHOUR COSTS
- REDUCE CONSTRUCTION SCHEDULE SPANS
- ACCOMPLISH WITHIN 5 YEAR SPAN

## STEERING COMMITTEE AND TASK GROUP MEETING(S)

- IDENTIFY CRITICAL PROBLEM AREAS
- DOCUMENT AND PRIORITIZE PROJECT PROPOSALS
- PROVIDE INDUSTRY CONCURRENCE AND COOPERATION

## STEERING COMMITTEE GOALS

- REVIEW SHIPBUILDING PROCESS FROM PRELIMINARY DESIGN TO DELIVERY
- DELINEATE TASK AREAS:
  - PRODUCTIVITY. PROBLEM DEFINED
  - IDENTIFY PROBLEMS TO BE ADDRESSED
- CREATE TASK GROUPS:
  - ASSIGN MEMBERS AND CHAIRPERSON
  - ASSIGN DUTIES AND RESPONSIBILITIES
- REVIEW AND COMMENT ON PROBLEM AREAS AND PROJECTS IDENTIFIED BY TASK GROUPS
- FINALIZE/APPROVE "THE PLAN"

## TASK GROUP GOALS

- ACCEPTANCE OF PROBLEM DEFINITION FROM STEERING COMMITTEE
- IDENTIFY CRITICAL PROBLEM AREAS IN THEIR TASK; EITHER TECHNICAL, INSTITUTIONAL, OR REGULATORY
- RECEIVE/SEND PROBLEM AREAS (NOT PROJECTS) TO OTHER TASK GROUPS VIA STEERING COMMITTEE
- DEVELOP PROJECTS ADDRESSING PROBLEM AREAS:
  - TASK, SUB-TASK
  - PROBLEM ADDRESSED
  - PROJECT OUTCOME
  - BUDGET (COST)/POSSIBLE FUNDING SOURCES

## TASK GROUP/SPC PANEL INTERACTION

<u>FUNCTION</u>	<u>S.P.C</u>	<u>S.C. REPRESENTATIVE</u>
• ENGINEERING	SPC-4	T. O'DONOHUE
• MANUFACTURING TECHNOLOGY	SPC-2	L. CHIRILLO
• MATERIAL HANDLING	SPC-1	O. GATLIN
• QUALITY ASSURANCE	SPC-2	E. PETERSEN
• HUMAN RESOURCES	SPC-9	E. BANGS
• MATERIAL MANAGEMENT	SPC-6	R. METAYER
• BUSINESS PRACTICES		J. HILLMANN

**SHIPBUILDING PROCESS FUNCTION**  
**OBJECTIVES**

- ENGINEERING ----- DESIGNS MUST ALWAYS OPTIMIZE  
PRODUCIBILITY AND MUST NOT CREATE  
THE RISK OF ERRORS AND INTERFERENCES.**
- MATERIAL MANAGEMENT----- IMPROVE MATERIAL MANAGEMENT  
SYSTEMS IN SUPPORT OF STATE-OF-THE-  
ART TECHNOLOGY IN THE SHIPBUILDING  
PROCESS, EMPHASIZING THE UNDERLYING  
NEED FOR STANDARDIZATION.**
- QUALITY ASSURANCE----- QUALITY MUST BE INTEGRATED INTO  
EVERY DIMENSION OF THE INDUSTRIAL  
ORGANIZATIONAL PRACTICE. QUALITY  
MUST BE REFLECTED IN PRODUCT DESIGN,  
SPECIFICATION, FABRICATION AND TEST.**
- MANUFACTURING TECHNOLOGY----- ACHIEVE COMPETITIVE OPERATIONS,  
ORGANIZATIONS AND METHODS WHEREIN  
TECHNOLOGICAL IMPROVEMENTS OCCUR  
CONTINUOUSLY REGARDLESS OF SCOPE.**
- MATERIAL HANDLING ----- DEVELOP AND MAINTAIN A LONG RANGE  
PLAN THAT WILL OPTIMIZE MATERIAL  
FLOW TO SUPPORT THE MANUFACTURING  
OR REPAIR PROCESS IN A TIMELY AND  
ECONOMICAL FASHION.**
- HUMAN RESOURCES----- THE CREATION OF AN ENVIRONMENT THAT  
WILL ATTRACT, TRAIN AND RETAIN  
QUALIFIED PEOPLE AND ALLOW THEM TO  
PERFORM AT OPTIMUM POTENTIAL.**
- BUSINESS PRACTICES.----- ACQUIRE AND PRESERVE AN ECONOMICALLY  
STABLE BUSINESS CLIMATE FOR SHIPBUILDING  
THAT WILL ENCOURAGE PRODUCTIVE  
PRACTICES IN DESIGN, MANAGEMENT AND  
MANUFACTURING.**

## ENGINEERING TASK GROUP

CHAIRMAN: **JAMES WILKINS, GROUP VP ENGINEERING**

**AVONDALE**

MEMBERS: **CHARLES STARKENBURG, VICE PRES,**  
**HERB DOBSON; CHIEF DESIGN & CONST, ENG.**  
**DENNIS GARRARD, CHIEF ENG. DIV,**  
**T. H, JACKSON, CHIEF ENG,**  
**PETER BUCKLEY, MGR, ENG. ,**  
**F. B. BARHAM JR., SPC-4 PROGRAM MGR.**  
**JURGEN KROHAN, MGR., PROD, ENG.**

**AVONDALE**  
**E.B.**  
**McDERMOTT**  
**TACOMA**  
**TODD**  
**NNS**  
**NASSCO**

### ENGINEERING

1. **INTEGRATION OF DESIGN/PRODUCTION EFFORT**
2. **DESIGN FOR PRODUCIBILITY**
3. **TIMELINESS OF DESIGN DATA**
4. **CONTROL CHANGES**
5. **STANDARDIZATION**

### ENGINEERING COMMENTARY

1. **LACK OF INTERFACE AND INTEGRATION OF OVERALL SHIPBUILDING CONCEPT**
2. **OVERDESIGNED FEATURES THAT IMPACT MATERIAL AND LABOR COSTS**
3. **ANTIQUATED SYSTEMS RESTRICT THE TIMELY ISSUE OF DESIGN DATA**
4. **EXCESSIVE CHANGES REDUCE ENGINEERING PRODUCTIVITY**
5. **LACK OF STANDARDIZATION IS NEGATIVELY INFLUENCING PRODUCTIVITY**



## MATERIALS MANAGEMENT

1. STANDARDIZATION
2. COMPUTERIZATION
3. RECEIPT/INSPECTION
4. PROCUREMENT
5. SPECIFICATIONS

## MATERIALS MANAGEMENT COMMENTARY

1. LACK OF MATERIAL AND DESIGN STANDARDS IMPACTS LEAD TIME LIMITATIONS AND VENDOR COMPLIANCE
2. A COMPUTERIZED SYSTEM THAT IS RESPONSIVE TO CHANGES IN PURCHASING, DESIGN, PRODUCTION, AND MATERIAL DELIVERY
3. INSUFFICIENT ATTENTION GIVEN TO NEEDS FOR SPECIAL PACKAGING
4. EXCESSIVE CHANGES TO MATERIAL AND EQUIPMENT AFTER DESIGN DETAILS ARE COMPLETE
5. PARTS IN MILITARY AND COMMERCIAL APPLICATIONS ARE DUPLICATES BUT ENTAIL DIFFERENT SPECIFICATIONS

## MATERIALS MANAGEMENT FIXES (8 PROGRAMS)

- o DEVELOP SPECIFICATION FOR MATERIALS MANAGEMENT COMPUTERIZED SYSTEM
- o CATALOG OF STANDARD (OFF-THE-SHELF AND NOT-OFF-THE-SHELF) COMMON PARTS
- o DEVELOP STANDARDS AND PROCEDURES FOR MATERIALS RECEIVING FUNCTION
- o DEVELOPMENT OF STANDARD EQUIPMENT MODULES
- o DEVELOP INDUSTRY WIDE PURCHASE ORDER FORMAT

**QUALITY ASSURANCE**  
**TASK GROUP PARTICIPANTS**

<b>CHAIRMAN:</b>	<b>T. AVGERINOS, DIR, Q.A.</b>	<b>TODD L.A.</b>
<b>MEMBERS:</b>	<b>LOU CHIRILLO, CONSULTANT</b> <b>ORVILLE GAUGER, Q, A, INSPECTOR</b> <b>GEORGE JOSE, CHIEF, IND. ENG.</b>	<b>TODD L, A.</b> <b>PETERSON</b> <b>E.B. QUINCY</b>

**QUALITY ASSURANCE**

- 1. SPECIFICATION AND STANDARDS**
- 2. MANAGEMENT DEDICATION TO QUALITY**
- 3. ADVANCED TECHNOLOGY**
- 4. REGULATORY QUALITY ASSURANCE APPROVAL**

**QUALITY ASSURANCE COMMENTARY**

- o INADEQUATE, OUTDATED, INCOMPLETE, AND POORLY DEFINED**
- o MANAGEMENT INCONSISTENT**
- o EXISTING QUALITY ASSURANCE PROCESSES ARE NOT COST EFFECTIVE AND INHIBIT INTRODUCTION OF ADVANCED TECHNOLOGY**
- o TIMELY APPROVAL OF NEW QUALITY ASSURANCE PROCESSES IS LACKING AND DELAYING THE CONSTRUCTION PROCESS**

QUALITY ASSURANCE FIXES (4 PROGRAMS)

- o THE DEVELOPMENT OF A RATIONAL APPLICATION OF STANDARD TESTS AND INSPECTION REQUIREMENTS FOR ALL COMMERCIAL AND GOVERNMENT CONTRACTS FOR NEW CONSTRUCTION AND REPAIR
- o DEVELOP AND INITIATE A MANAGEMENT TRAINING PROGRAM THAT WILL INCREASE MANAGEMENT'S AWARENESS OF QUALITY ASSURANCE IN THE SHIPYARD AND THE COMMITMENT TO QUALITY
- o ESTABLISH AN ADVANCED TECHNOLOGY TASK GROUP TO IDENTIFY SHIPBUILDING INSPECTION PROCESS AREAS THAT ARE COST DRIVERS OR DELAY PRODUCTION AND IDENTIFY ADVANCED TECHNOLOGY WITH POTENTIAL APPLICATION
- o DEVELOP LIST OF ALL PROCESSES AND PROCEDURES THAT HAVE BEEN APPROVED AND CIRCULATE THROUGH INDUSTRY. IT WILL ALSO BE INSTALLED IN DATA BANK

MANUFACTURING TECHNOLOGY

TASK GROUP PARTICIPANTS

Lou CHIRILLO, CONSULTANT

Todd L.A.

JAMES ACTION, Mgr. R&D  
ROBERT DERUSHA, DIR.FAC.& IND.ENG..  
JOHN DOUGHERTY  
ORVILLE GAUGER, Q.A. INSPECTOR  
GEORGE JOSE, CHIEF IND. ENG.

Todd L.A.  
NASSCO  
COLLING. TORONTO  
PETERSON  
E.B.-QUINCY

**MANUFACTURING TECHNOLOGY FIXES (7 PROGRAMS)**

- o **TECHNOLOGY IMPLEMENTATION PLAN**
  - **THE INTERRELATING OF NEW TECHNOLOGIES**
  - **A PROCEDURE THAT ENABLES THE INDIVIDUAL SHIPYARD TO DETERMINE ITS CURRENT STATUS RELATIVE TO NEW TECHNOLOGY**
  - **A TIME PHASED APPROACH TO NEW TECHNOLOGY IMPLEMENTATION**
- o **THE DEFINING OF PLANNING AS A SHIPYARD FUNCTION**
- o **ZONE ORIENTED WORK PACKAGE**
- o **PRODUCT WORK BREAKDOWN STRUCTURE FOR SHIP OVERHAULS**
- o **INTEGRATION OF COST EFFECTIVE WELDING AND RELATED PROGRAMS**

**MATERIALS HANDLING  
TASK GROUP PARTICIPANTS**

**\*OLLIE GATLIN, VP-CORPORATE PLANT**

**AVONDALE**

**THOMAS W ARCHER, ENV ENGINEER**

**ELECTRIC BOAT**

**LYN HAUMSCHILT, MANAGER-FACILITIES & IND. ENG,**

**NASSCO**

**RICHARD A, PRICE, PROJECT MANAGER**

**AVONDALE**

**L. NORMAN WADDELL, MANAGER-MANU. ENG.**

**INGALLS**

**GEORGE H. CURTIS III, VP-FACILITIES ENG.**

**N O R F O L K**

**MATERIALS HANDLING**

- 1. PROCESS SYSTEMS**
- 2. WORK AREAS**
- 3. UNIT MOVEMENT**

### **MATERIALS HANDLING COMMENTARY**

- 1. MAJOR DEFICIENCIES EXIST IN HANDLING SYSTEMS WITHIN THE PROCESS SYSTEMS**
- 2. MAJOR COST DRIVERS EXIST IN:**
  - ERECTION AND FABRICATION AREAS**
  - WET DOCK AND PIERS**
  - FLOATING AND GRAVING DOCKS**
  - STORAGE AREAS**
- 3. UNIT MOVEMENT CAUSES PROBLEMS IN MATERIAL HANDLING**

### **MATERIALS HANDLING FIXES (12 PROGRAMS)**

- o MOVING PERSONNEL AND LIGHT MATERIAL ONTO A SHIP OR ABOUT A SHIPYARD**
- o PIPE STORAGE AND MOVEMENT**
- o DEVELOPMENT/APPLICATION OF A MODULAR PALLET TRANSPORT SYSTEM**
- o ADVANCED WAREHOUSING CONCEPTS**
- o THE APPLICATION OF COMPUTER TECHNOLOGY TO:**
  - THE MONITORING OF FUEL USAGE**
  - SHIPYARD FACILITY LAYOUTS**
- o THE DEVELOPMENT OF A UNIVERSAL TRANSPORTER**

HUMAN RESOURCES  
T A S K G R O U P

**FRANK J. LONG, GEN. MGR., HUMAN RES.**

**BETH, STEEL**

**D. ANDERSON, DEPT, PSYCHOLOGY**

**NOTRE DAME-**

**H. BUNCH, SPC-9 CHAIRMAN**

**UNIV. MCH.**

**M. GAFFNEY, PROG, MGR.**

**MTRB**

**J. HARTIGAN, DIR, SHIPYARD TRAIN,**

**NAVSEA**

**HUMAN RESOURCES**

- 1. EDUCATION**
- 2. ACQUISITION AND RETENTION**
- 3. COMPENSATION SYSTEMS**
- 4. BEHAVIORAL PRACTICES AND TECHNIQUES**
- 5. WORK FORCE DATA BASE**

**HUMAN RESOURCES COMMENTARY**

- 1. INSUFFICIENT AMOUNT OF PROPERLY TRAINED PROFESSIONAL, SUPERVISORY, AND TRADES PERSONNEL**
- 2. HIGH ATTRITION IN SKILLED TRADES**
- 3. SYSTEMS DO NOT FOSTER SKILL ACQUISITION AND PRODUCTIVITY IMPROVEMENT**
- 4. INSUFFICIENT APPLICATION OF BEHAVIOR AND MOTIVATIONAL TECHNIQUES**
- 5. THERE IS A NEED FOR A CONSTANTLY UPDATED WORK FORCE DATA BASE**

**HUMAN RESOURCES FIXES (12 PROGRAMS)**

**o EMPLOYEE MOTIVATION**

- ANALYSIS OF SELECTED HUMAN RESOURCE ISSUES THAT ARE CONSIDERED COST DRIVERS AND IMPACT PRODUCTIVITY
- DEVELOPMENT OF "ZERO" VOLUNTARY AND INVOLUNTARY TERMINATION PROGRAM
- DEVELOPMENT OF SKILLED TRADES COMPENSATION SYSTEMS TO REFLECT INDIVIDUAL AND GROUP PRODUCTIVITY ACHIEVEMENTS
- DEVELOP SYSTEM TO ESTABLISH AN EQUITABLE RELATIONSHIP BETWEEN SKILLED TRADES AND MANAGEMENT COMPENSATION LEVELS

**o PERSONNEL POLICIES AND PROCEDURES**

- "ZERO" ACCIDENT PROGRAMS
- REDUCTION OF ATTRITION RATES OF SKILLED WORKERS
- PROGRAMS TO ATTRACT NEW TRADES AND PROFESSIONAL EMPLOYEES

**o TRAINING AND DEVELOPMENT**

- EXPANDED USE OF IN-HOUSE TRAINING PROGRAMS

BUSINESS ENVIRONMENT

TASK GROUP PARTICIPANTS

CHAIRMAN: **FRED HILLMANN.** DIR. BUS. DEV.

**LEVINGSTON**

MEMBERS: **STUART S. ADAMSON: V.P.**

**SHIP. COUNCIL AM,**

**HERBERT FREINBERG, GEN. MGR, OP. & FAC.\***

**BETH STEEL**

**JOHN M. HOTALING, MGR. SHIP. ANALYSIS**

**MARITIME ADM**

**GORDON PLANCICH, SUPV., ENG, COMPUTER SERV.**

**J.J. HENRY**

**RICHARD W. THORPE, V.P. CORP. PLAN; & DEV, J.**

**J. J. McMULLEN**

### **BUSINESS ENVIRONMENT**

1. **CONTRACTS AND SPECIFICATIONS**
2. **REGULATORY BODIES**
3. **R&D PRODUCT DEVELOPMENT**
4. **BUSINESS PLANNING**

### **BUSINESS ENVIRONMENT COMMENTARY**

1. **CONTRACTS WITH INEFFICIENT LANGUAGE, PRACTICES AND REQUIREMENTS**
2. **IMPOSE OUTDATED AND REDUNDANT REQUIREMENTS**
3. **NO R&D ACTIVITY DUE TO LACK OF INCENTIVES**

### **BUSINESS ENVIRONMENT FIXES (7 PROGRAMS)**

- o **IDENTIFYING ALTERNATIVE ACTION THAT GOVERNMENT CAN TAKE TO ASSIST THE INDUSTRY IN STRENGTHENING ITS WORLD MARKET POSITION**
- o **ANALYSIS OF WORKLOAD VARIABILITY ON SHIPBUILDING PRODUCTIVITY**
- o **THE PROPOSAL OF ALTERNATE SYSTEMS TO IMPROVE THE NAVAL SHIP PROCUREMENT PROCEDURES**
- o **ANALYSIS OF EXISTING NAVAL SPECIFICATIONS AND IDENTIFICATION OF REQUIRED REVISIONS**
- o **THE DEFINITION AND REQUEST FOR REVISION OF REGULATORY REQUIREMENTS THAT NEGATIVELY IMPACT COST AND PRODUCTIVITY**

## IMPLEMENTATION

- IMMEDIATE SOLUTION TO SELECTED PRODUCTIVITY PROBLEMS
- REFERENCE FOR ESTABLISHING ADVANCED STRATEGIC PLANS (GOVERNMENT AGENCY)
- REFERENCE FOR SHIPYARD PLAN FORMULATIONS AS IT RELATES TO SHIPBUILDING FUNCTIONS
- MEDIUM AND LONG RANGE PLANNING GUIDE AT SHIPYARD LEVEL
- GENERAL EDUCATION GUIDE TO PLAN DEVELOPMENT AND SHIPYARD FUNCTIONS
- PLANNING APPLICATIONS FOR SUPPLIERS AND CONTRACTORS

## PROJECT FUNDING

### FUNDING SOURCES

- PRIVATE SHIPYARDS
- SUPPLIERS AND SUBCONTRACTORS
- NAVAL ARCHITECTURE/MARINE ENGINEERING AND OTHER CONSULTING FIRMS
- U. S. NAVY
  - NATIONAL SHIPBUILDING RESEARCH PROGRAM
  - PROCUREMENT CONTRACTS
  - TECH MOD/MANUFACTURING TECHNOLOGY/ SHIPBUILDING TECHNOLOGY
  - INDEPENDENT RESEARCH AND DEVELOPMENT
- MARITIME ADMINISTRATION
  - NATIONAL SHIPBUILDING RESEARCH PROGRAM
- U. S. COAST GUARD
  - PROCUREMENT CONTRACTS

## PLAN BENEFITS

### CUSTOMER

- PRIMARY — REDUCED COST OF SHIPS  
REDUCED CONSTRUCTION SCHEDULES  
SHIPS OF HIGHER QUALITY  
DATA ESSENTIAL TO STRATEGIC  
ADVANCED PLANNING
- SECONDARY — PROVIDES INDUSTRY WIDE "VOICE"  
SMOOTHER CUSTOMER/SELLER  
NEGOTIATIONS  
ACCELERATE PROJECT FUNDING CYCLE  
STREAMLINE THE CONTRACTING PROCESS

### INDUSTRY

- PRIMARY INCREASED PRODUCTIVITY  
REDUCED COSTS  
ESTABLISH MARKET COMPETITIVE  
POSITION INCREASED SALES  
STRENGTHEN AND STABILIZE  
FINANCIAL POSITION  
INCREASED R&D BUDGET
- SECONDARY IMPROVED WORKING CONDITIONS  
REDUCED PERSONNEL TURNOVER

### NATIONAL

- PRIMARY — SAVINGS TO THE TAXPAYER  
BETTER USE OF TAXPAYER DOLLARS  
REDUCED UNEMPLOYMENT  
STRONGER AND QUICKER RESPONSE  
TO THE NATION'S DEFENSE
- SECONDARY — STRENGTHENING AND PROVIDING A  
FIRM INDUSTRIAL BASE FOR U. S.  
SHIPBUILDING INDUSTRY  
CONTRIBUTES TO HEALTHIER ECONOMY  
STIMULATES AND ATTRACTS NEW  
PERSONNEL

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