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**REPORT
ON
SHORT COURSE

ON

IMPLEMENTATION OF ZONE
TECHNOLOGY IN THE REPAIR AND
OVERHAUL ENVIRONMENT**

**A Project of
the National Shipbuilding Research Program**

for

**The Society of Naval Architects and Marine Engineers
Ship Production Committee**

Education and Training Panel (SP-9)

PREPARED BY

**Thomas Lamb
University of Michigan Transportation Research Institute
Marine Systems Division
Ann Arbor, Michigan**

May 1997

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16. Abstract This report summarizes the presentation of the short course: Implementation of Zone Technology in the Repair and Overhaul Environment. It also includes course contents and feedback from the attendees. The feedback from the attendees is worth reviewing as it includes many good suggestions on how future courses could be developed and presented as well as who should attend such courses.			
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This report has been prepared to record the performance and results of the short course presented around the U.S. in 1996.

Without the assistance of a number of shipyards, which sponsored the courses in their facilities and assisted, with some of the arrangements, the courses would not have been presented.

The short course on Implementation of Zone Technology in Repair and Overhaul project was funded by the National Shipbuilding Research Program, Education and training Panel (SP-9), chaired by Pamela Cohen of UMTRI. The SP-9 Panel is one of the Ship Production Committee panels of the Society of Naval Architects and Marine Engineers, which were established with the purpose of improving U.S. shipbuilding performance.

EXECUTIVE SUMMARY

This report is the final report and summarizes the presentation of the short course on Implementation of Zone Technology in the Repair and Overhaul Environment. It also includes course contents and feedback from the attendees.

The feedback from the attendees is worth reviewing as it includes many good suggestions about how future courses should be developed and presented as well as who should attend such courses.

The course was planned to be presented in four locations around the country. The locations were:

NASSCO, San Diego
Todd Pacific Shipyards, Seattle
Mobile, Alabama
BethShip, Baltimore

Unfortunately, BethShip was unable to host the course as planned so the course was presented in only three locations.

The course was well received at Seattle and Mobile but bombed at NASSCO. Actual attendance was always considerably less than that signed up.

A requirement of this project was that the material and case studies be used in the development of new Ship Production courses at The University of Michigan, Department of Naval Architecture & Marine Engineering.

At the end of each course the attendees were requested to fill out a course evaluation sheet. The responses have been collected and grouped together for the record and are provided in Appendix C. Unfortunately, due to the shortened scope of the course at NASSCO, no evaluations were picked up.

TABLE OF CONTENTS

1.0 INTRODUCTION.....	1
2.0 COURSE PLANNING.....	2
3.0 COURSE VENUE.....	3
4.0 COURSE PRESENTATION.....	3
5.0 COURSE ATTENDANCE.....	4
6.0 CASE STUDIES.....	4
7.0 COURSE FEEDBACK.....	4
8.0 USE IN UNIVERSITY OF MICHIGAN COURSES ON SHIP PRODUCTION	5
9.0 LESSONS LEARNED.....	5
APPENDIX A - SHIPBUILDING TRAINING COURSES INDUSTRY SUPPORT QUESTIONNAIRE	
APPENDIX B - COURSE AGENDA	
APPENDIX C - ATTENDEE FEEDBACK	

1.0 INTRODUCTION

The short course on Implementation of Zone Technology in the Repair and Overhaul Environment project was originally conceived in 1990 and a proposal developed by University of Michigan Transportation Research Institute's Marine Systems Division (UMTRI/MSD). The concept was to interview both private and public ship repair and overhaul companies, and develop case studies that could be used in both short courses and in university level undergraduate courses. The project suffered a period of inaction from 1993 until 1995 due to fund-related problems. The project was started by Howard Bunch. Coopers & LYBRAND LLP were selected to perform the interviews and prepare the case. Howard Bunch retired from UMTRI/MSD before it was completed and the task fell to his predecessor, Richard Moore, who in turn assigned the project to Thomas Lamb, who had just joined UMTRI/MSD in June 1995.

This report details the final course contents, where they were presented and by whom, as well as attendance and feedback from the attendees.

2.0 COURSE PLANNING

The first step in the planning was to assign presenters who would also be responsible for preparing the course material. Personnel from Coopers & Lybrand LLP were unavailable and Thomas Lamb performed the preparation of the actual course material and all the presentations.

Notice about the short course on Implementation of Zone Technology in the Repair and Overhaul Environment was included in the same notice for the Short Courses for Shipyard Workers and Managers, another SP-9 project, which was published in the NSRP Newsletter and the SNAME MARINE TECHNOLOGY. In addition, UMTRI/MSD sent out notices to all program managers, panel chairpersons and members. The later mailing included a request for indication of interest, how many attendees were anticipated and if shipyards would be willing to hold the course in their facilities. A copy of this form is attached as Appendix A.

From the responses, plus many phone calls, a potential attendance profile for the course was developed and the four areas that had the most potential attendees were selected. They were San Diego, Seattle, Baltimore, and the Gulf. Some of the companies interested in the other short courses were not interested in this course. Brochures were prepared for each location, which included a description of the course and schedule, and they were sent to the same distribution as the initial notice with request to distribute throughout companies. An individual brochure was not prepared for the course. Where the area had indicated an interest in the course, it had been included in the brochure for the other short courses. Therefore, when the registration request was sent out, a copy of the course agenda, shown in Appendix B, was included. Finally, registration forms were sent to the same distribution as the other promotional documents. The complete course presentation record is given below.

DATE

LOCATION

April 24-26, 1996

Todd Pacific Shipyard, Seattle

May 1-2, 1996

NASSCO, San Diego

May 22-24, 1996

Mobile, Alabama

3.0 COURSE VENUE

The table in section 2.0 - COURSE PLANNING shows where the courses were held. When they were held in a shipyard or design office, they agreed to let outsiders attend. The assistance of the companies in providing space and equipment is appreciated.

At first, it was considered important to hold the presentations in shipyards based on the belief that this would maximize attendance. While it is still believed that this is true, it had the disadvantage that attendees were subject to calls from within the shipyard and being pulled out of the session to deal with "crises." In Mobile, the course was held in locations near the two shipyards, was well attended, and interference was considerably less. However, some attendees went back to their office during lunch break and a few sometimes did not make it back for the afternoon.

4.0 COURSE PRESENTATION

The course material consisted of the presentation slides, supportive write-ups and papers/articles on the subject matter. These were bound into a course manual and each attendee given a copy. In addition, videos on aspects of the subject as well as many photographs were used.

The approach to the course was to give as much hands on activity as possible. Therefore, exercises were inserted in each section. Typically, the first day consisted of more lecture and discussion time devoted to exercises increasing as the course continued. For this course three case studies were used for the major hands on experience. This can be seen from the course agenda which is attached in Appendix B.

The course manual has been given NSRP report numbers as follows:

NSRP 0470 IMPLEMENTATION OF ZONE TECHNOLOGY IN THE REPAIR AND OVERHAUL ENVIRONMENT

5.0 COURSE ATTENDANCE

The attendance was disappointing for five reasons:

1. The overall numbers were low. Average was 14.
2. Four of the major shipyards and all of the inland shipyards did not participate.
3. Very few managers attended.
4. Very few engineers attended.
5. Sometimes 30% of those who had signed up did not attend.

The attendance record is as follows:

SEATTLE	SAN DIEGO	MOBILE
29/20	14/9	10/7

The first number is the number of people who signed up. Second number reflects actual attendance.

6.0 CASE STUDIES

The preparation of the case studies was sub-contracted to Coopers & Lybrand LLP. Their responsibility was to use their ongoing experience with both private and public shipyards, as well as additional interviews as required, to select up to four case studies. The concept was to select a range from highly successful contracts to disasters if possible, so that the teams could learn from good and bad experiences. One of the not so good case studies was withdrawn, as permission to use it was not granted.

The case studies were all from public shipyards and were for conversions on the BEAVER STATE, PROVIDENCE and CUSHING. The amount of material provided by Coopers & Lybrand was overwhelming and it was necessary to reduce it to an amount suitable for its intended purpose for both short and university courses. This activity was performed by UMTRI/MSD. The case studies are not appended to this report as they are part of the course manual and copies can be obtained from the NSR Documentation Center at UMTRI.

The case studies were well received by the attendees, especially as many of them were ex-public shipyard employees and could relate to the problems and provide considerable experience for the discussions.

7.0 COURSE FEEDBACK

At the end of the course the attendees were requested to fill out a course evaluation sheet, such as the one attached in Appendix C. The responses have been collected and grouped together for the record and are provided in Appendix C. No evaluations were picked up at NASSCO because of the shortened scope of the course presentation.

8.0 USE IN UNIVERSITY OF MICHIGAN COURSES ON SHIP PRODUCTION

The material developed for the course manual other than the case studies has been integrated into The University of Michigan, Department of Naval Architecture & Marine Engineering, new NA275 - MARINE SYSTEMS MANUFACTURING course. It has been condensed to fit into two 2 hour classes. The case studies will be used as team project assignments in the NA460 - SHIP PLANNING AND SCHEDULING course and will also be used as topics for the NA562 - CONCURRENT MARINE DESIGN course, which is a teamed, based business simulation. The case studies will also be available to students as prospective material on which to base further research and/or study.

9.0 LESSONS LEARNED

The attendees' feedback can be used for lessons learned. In addition, there are lessons learned by the course presenters. Some of the more important lesson which should be considered for future courses are listed below:

- A. For courses that exceed one day, the last day should only be scheduled for morning. In all courses, except at Bath Iron Works (BIW), up to 50% of the attendees disappeared on the final afternoon.
- B. For multi-day courses, maximize discussion and activities for attendees.
- C. Actual lecturing should be kept to below 50% of time.
- D. Use a number of presenters, rather than just one. If this is not possible, for whatever reason, break the focus on the presenter by using supporting videos.
- E. Distribute course material to attendees before course presentation and provide incentive for attendees to review before attending. This is very important based on experience at NASSCO, where attendees decided that they did not need any of the presentations and only wanted to go through the case studies as quickly as they could. The three day schedule was cut down to 1 1/2 days.
- F. Hold off-site. This has many benefits and a few obvious disadvantages. One major benefit is in the area of promoting teamwork. A couple of hours in the late afternoon can be used for teams to prepare their assignments.
- G. It is very important to determine if there is a desire for the course from industry, before it starts.
- H. It is difficult to maintain interest in a project that is stopped for a period of time and that involves changing leadership.

APPENDIX A

SHIPBUILDING TRAINING COURSES INDUSTRY SUPPORT QUESTIONNAIRE

NSRP SP-9 PANEL (EDUCATION & TRAINING)

SHIPBUILDING TRAINING COURSES INDUSTRY SUPPORT QUESTIONNAIRE

YES NO

1. Are the proposed training courses of interest to you?
2. Will your support depend upon location of meeting place?
3. Can you provide meeting space and are you willing to let other company personnel attend? (Assume attendance will be from 20 to 40.)
4. Is the proposed schedule for courses in your area acceptable to you?
5. How many people will you send to each course:

COURSE	IN YOUR FACILITY	IN YOUR TOWN	WITHIN DAILY DRIVING DISTANCE	REQUIRE OVER-NIGHT STAY
1				
2				
3				
4				
5				

6. Please identify any additional topics you would like to see covered.

7. Do you have any other recommendations/ideas for the training courses?

COMPANY: _____

NAME: _____ DATE: _____

APPENDIX B

COURSE AGENDA

AGENDA - FIRST DAY

MORNING

- | | |
|-----------------|---------------------------------|
| 8.00 - 8.30AM | INTRODUCTIONS |
| 8.30 - 9.30AM | SHIP REPAIR AND OVERHAUL REVIEW |
| 9.30 - 9.45AM | BREAK |
| 9.45 - 10.30AM | WHAT IS ZONE TECHNOLOGY |
| 10.30 - 11.30AM | ZONE TECHNOLOGY BENEFITS |
| 11.30 - 12.30PM | LUNCH |

AFTERNOON

- | | |
|----------------|---|
| 12.30 - 1.30PM | IS ZONE TECHNOLOGY APPLICABLE TO SHIP PAIR AND OVERHAUL |
| 1.30 - 2.00PM | PRODUCTIVITY EXERCISE |
| 2.00 - 2.15PM | BREAK |
| 2.15 - 3.30PM | CASE STUDY 1 |

AGENDA - SECOND DAY

MORNING

8.00 - 8.30AM FIRST DAY REVIEW

8.30 - 9.30AM ORGANIZATION FOR ZONE TECHNOLOGY

9.30 - 9.45AM BREAK

9.45 - 10.30AM DESIGN FOR SHIP REPAIR AND OVERHAUL ZONE TECHNOLOGY

10.30 - 11.30A PLANNING AND SCHEDULING FOR SHIP REPAIR AND OVERHAUL ZONE TECHNOLOGY

11.30 - 12.30PM LUNCH

AFTERNOON

12.30 - 1.00PM SCHEDULING EXERCISE

1.00 - 2.00PM PRODUCTION AND MATERIAL CONTROL FOR SHIP REPAIR AND OVERHAUL ZONE TECNOLGY

2.00 - 2.15PM BREAK

2.15 - 3.30PM CASE STUDY 2

AGENDA - THIRD DAY

MORNING

- | | |
|-----------------|---------------------|
| 8.00 - 8.30AM | SECOND DAY REVIEW |
| 8.30 - 9.45AM | CASE STUDY 3 |
| 9.45 - 10.00AM | BREAK |
| 10.00 - 11.15AM | CASE STUDY 4 |
| 11.15 - 11.30AM | SUMMARY AND WRAP-UP |

**PLEASE TAKE TIME TO COMPLETE THE
COURSE EVALUATION FORM IN THE BACK OF
YOUR COURSE BOOK**

APPENDIX C

ATTENDEE FEEDBACK

COURSE EVALUATION

We would be very grateful for your feedback on the course. Please complete this evaluation form and return it at the end of the course. Two copies are provided so that you can keep a copy of your evaluation. Thank you!

THE MOST HELPFUL THINGS I LEARNED FROM THE COURSE ARE:

- 1.
- 2.
- 3.

WHAT I LIKED BEST ABOUT THE COURSE WAS:

WHAT I DISLIKED MOST ABOUT THE COURSE WAS:

RECOMMENDATIONS FOR FUTURE COURSES

ANY OTHER COMMENTS?

NAME (OPTIONAL)

Zone Technology

Scheduled Attendees: 25

Todd

Actual Attendees: 20

The Most Helpful Things I Learned From The Course Are:

The need to re-organize the organization to support changing work methods.

Our shipyard management narrowly focuses upon doing things right not are we doing right things. Change is difficult to introduce with success in my organization where (I) is prevalent.

The only practical application of "zone technology" to repair that I got from this course was management approach and organization.

Z.T. is applicable to ship repair. Z.T. can bring about cost change.

Zone concept can be used in repair evolutions with proper planning and organizing.

Zone technology. Case studies. Planning importance.

Longer management of any project/job. Timely planning and scheduling. Naval shipyards habits and practices.

I'm not sure yet. I need to review my notes and think about what I've heard and read. We have been hearing this same type of approach for several years and learning to apply it to repair takes some innovation.

Group technology is applicable to ship repair. There are a lot of opportunities in ship repair.

Zone technology can work. You need commitment from the top.

If Navy yards can improve, anybody should be able to. Zone repair focus has been proven to cut costs.

Learning about other approaches to ship build/repair. Seeing the pitfalls in change and how to manage change.

Proper upfront planning (long term). Proper involvement of team approach. There is more than one way to do it.

Risk factor in estimating.

How to eat an elephant. It is most difficult to learn something when you don't understand where the instructor is going. Management appears to still not understand that we accept module construction and change the way they are beating a dead horse.

Zone technology in order to work must be proceeded by change to traditional approaches to mgmt. and production. Change must be made by all involved. When a new system fails, workers resort to the way that worked in the past.

In starting a new project get well informed and have a good team. The course was well on track and kept you in tune overall. What works in one shipyard may not work in other.

Broader knowledge base of the way the yard intends to go. Understanding zone technology. Understanding the probabilities as applied to estimating.

Risk assessment. Zoning designation.

Risk assessment.

Zone Technology
Todd

Scheduled Attendees: 25
Actual Attendees: 20

What I Liked Best About The Course Was:

Concepts backed up by case studies.

Case study allowed for exercise learning and mental gymnastics with broad group input/involvement by the talbe team. Instructor was good in facilitating interest and exchanges.

Case studies illustrated actual examples of application or failure of application of the project management approach.

Practical course study application of Z.T. good overview of project features.

Evaluating case studies.

Case studies - everyone had different veiws/ideas.

Various case studies.

N/A

The format case studies that were applicable to the subject matter.

The overall information is good the case studies are interesting best would be planning and scheduling.

Case studies were very interesting.

Case studies.

Good examples of real life outcomes of projects.

Case studies.

I found it of little value.

The professional delivery.

Case studies talking over the question.

Presentation.

Risk assessment material.

Risk assessment.

Zone Technology

Scheduled Attendees: 25

Todd

Actual Attendees: 20

What I Disliked Most About The Course Was:

Nothing, thoroughly enjoyed it.

An opportunity to reflect how the case study principles could positively apply from beyond example to "our" specific company.

All of the statements/claims about benefits of zone technology approach to repair were made, but not adequately defined or supported.

Focus on principles behind structure of Z.T. i.e. why ship is broken down the way it is, cost reporting sys., scheduling sys., what was their objective.

That the course was designed for upper management.

Too much - too quick.

N/A

No demonstration on how zone technology can be applied by US. When we would ask, we were told it won't work on all jobs. Too much talk of Navy yards, we do not have as much room for the improvements or the funds to implement.

Too much time spent on technical details, i.e. ship comp. identification, pert gant and not enough time on how it applies to "G.T".

All info was based on Navy experience.

Lack of transition from Navy yard projects with 9 or so months of prep time to commercial projects with a range of 2 months to 2 days prep time. Also spent too much time on Navy yard problems.

N/A

Did not find eng.

Not enough about setting up zones for ship repair and overhaul.

The information presented did not cover the advertised information that I understood would be presented.

N/A

Too much on new ship construction and needs to have more on repair.

Nothing.

Dated materials. Materials were not user friendly (e.g. no page numbers). Case studies ate up too much time.

Dated material, loose handouts, material is not user friendly.

Zone Technology

Scheduled Attendees: 25

Todd

Actual Attendees: 20

Recommendations For Future Courses:

N/A

When a "Plan Booklet" is isometric with only pertinent zone information, please provide a sample in handouts to illustrate. Also, handout material in advance of courses with suggested reading list syllabus to allow student advance reading & preparation.

Case studies were valuable, but took too much time. Suggest limit number of case studies to allow more time to better define and describe other zone technology applications to repair.

Principles of "on-board outfitting". Principles for team organization.

N/A

A little more lead-in from the instructor. Sample: zone coding - no real discussion / no explanation on "diodi" etc.

N/A

Give more detailed direction to perform the excersises.

More time on the practical aspects or a.t. as applicable to ship repair.

More info on commercial repair/overhaul, conversion yards.

Perhaps in addition to the discussion on the case studies more discussion could focus on commercial options. Maybe some what - if scenarios and solutions that would help apply zone repair principles.

Instructor needs to be more organized.

All book sets up for three ring binder with coerand tabs. - (2" with book end)

More information about zone technology and its set up, than what it has done for users.

Tell us how to build ships using module construction and new worker organization.

N/A

More break down on the way for repair to work more in tune.

None.

Updated some materials (1970 material is 26 years old) organize and bind all material, provide tabs. Drop case studies as a "bulk" of class, too much time spent on studies.

All handouts should be in ring binders and pages numbered, in this way during the course one can follow without trying to see through someones head.

Zone Technology

Scheduled Attendees: 25

Todd

Actual Attendees: 20

Any Other Comments?:

N/A

Why did top management not attend from many shipyards? The course should have received substantial support and attendance by Sr. managers as well as midline to the shop level.

N/A

Good overview - primarily derived from ship construction - specific principles for repair should be dealt in more detail.

I feel this course should be presented to all team management personnel prior to undertaking these changes in business policies.

Would like to see/attend a follow-up course or see some cases in which these courses are used. Targets - goals - zone technology.

N/A

N/A

Thank you for the opportunity to attend.

N/A

Different application of zone repair to jobs without eng. vs repair jobs that shouldn't proceed until eng. is complete. Also repair jobs where a unit outfit approach would still apply.

N/A

Thank you Tom, you did a good job of set up.

In the 1970s at Hawkins Point Naval shipyard zone management was used on major carrier overhauls.

Wake me when it's over. I want to thank the instructor for his dedication to his job and his ability to preservice.

The "build strategy" is a concept that WSF could benefit from using on renovation projects.

N/C

None.

Chairs were back breakers. This material is a bit dry and class accommodation are critical to staying on-line.

N/A

Zone Technology

Scheduled Attendees: 10

Mobile

Actual Attendees: 7

The Most Helpful Things I Learned From The Course Are:

See how zone technology can be used to different levels for each job (ship repair). Need to look for non value added items in eng.

Establish criteria to become successful policy-strategy. Teamwork is the key to a successful shipyard - communication. We need an integrated system to be competitive.

The basic concept of zone management. How to implement zone management. The importance of management organization associated with zone technology.

Most shipyards do not have a formal business plan.

I am now much better able to tie the planning and scheduling systems to costing and other financial reportings. Further, the course seemed to validate my personal belief about how these systems must be organized.

Breaking work packages into blocks. Differing organizational approaches. Perspectives of other yards and status of world class yards.

Sensitivities of other shipyard cultures. Methodology of 'zone' applications. Responsibilities/accountability of front line supply.

Zone Technology

Scheduled Attendees: 10

Mobile

Actual Attendees: 7

What I Liked Best About The Course Was:

Views of how work is done in other areas of country and world.

Open forum, your attitude that each shipyard/job is unique and that different methods can be applied to suit each situation, not autocratic.

The information package is thorough and the instructor is knowledgeable and experienced in the industry.

N/A

Case studies. Why do things go wrong. Also, the discussions of management techniques.

Instructors vast and varied experience.

Real case studies. 'Round Table' discussion. Good supporting literature in course documents.

Zone Technology

Scheduled Attendees: 10

Mobile

Actual Attendees: 7

What I Disliked Most About The Course Was:

All cases were dealing with Navy shipyards. Would like to see zone technology examples in commercial yards.

Did not address the repair/zone concept to my satisfaction. This seems like a hurry up and put something together course.

Should have a case study involving a commercial subject.

N/A

Filling out this form.

Too gov't oriented. International commercial competitiveness and gov't work don't go hand in hand. A bit academic more real-world examples would increase understanding.

Some material offered out of sequence with the booklet structure.

Zone Technology

Scheduled Attendees: 10

Mobile

Actual Attendees: 7

Recommendations For Future Courses:

Number pages in booklet would be helpful. Booklet and slide show being used in the same order.

You need to number the pages in your handout. Would like a course on what type of equipment should be installed in which stages and why. I think you need to highly stress the importance of team upfront planning.

N/A

N/A

In this industry (especially) all info systems managers, directors, ceos, ect should have to take this course (and other related courses).

Case studies of pure commerical jobs. Maybe, walk through building a block with zone planning.

Need page numbers.

Zone Technology

Scheduled Attendees: 10

Mobile

Actual Attendees: 7

Any Other Comments?:

Enjoyed meeting you and hearing your stories.

It was a pleasure meeting you and I hope to gather more from your insights on shipbuilding.

N/A

Handouts should be indexed to agenda and page numbers.

Good course. Enjoyed it very much.

N/A

Very difficult to apply - 'skill is with the mechanic' to unskilled workforce. Will use course documents for future reference & comparison.