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 1985
NSRP 0226

THE NATIONAL SHIPBUILDING RESEARCH PROGRAM

1985 Ship Production Symposium
Volume I
Paper No. 15:
Multi-skilled Work Teams in a Zone Construction Environment

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

Report Documentation Page

Form Approved
OMB No. 0704-0188

1. REPORT DATE	2. REPORT TYPE	3. DATES COVERED
SEP 1985		**00-00-1985 to 00-00-1985**

4. TITLE AND SUBTITLE	5a. CONTRACT NUMBER
The National Shipbuilding Research Program. 1985 Ship Production Symposium, Volume I, Paper No. 15: Multi-skilled Work Teams in a Zone Construction Environment	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) **Naval Surface Warfare Center CD,Code 2230 -Design Integration Tower,9500 MacArthur Blvd Bldg 192 Room 128,Bethesda,MD,20817-5700**	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
Approved for public release; distribution unlimited

13. SUPPLEMENTARY NOTES

14. ABSTRACT

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT	b. ABSTRACT	c. THIS PAGE			
unclassified	**unclassified**	**unclassified**		**20**	

DISCLAIMER

These reports were prepared as an account of government-sponsored work. Neither the United States, nor the United States Navy, nor any person acting on behalf of the United States Navy (A) makes any warranty or representation, expressed or implied, with respect to the accuracy, completeness or usefulness of the information contained in this report/ manual, or that the use of any information, apparatus, method, or process disclosed in this report may not infringe privately owned rights; or (B) assumes any liabilities with respect to the use of or for damages resulting from the use of any information, apparatus, method, or process disclosed in the report. As used in the above, “Persons acting on behalf of the United States Navy” includes any employee, contractor, or subcontractor to the contractor of the United States Navy to the extent that such employee, contractor, or subcontractor to the contractor prepares, handles, or distributes, or provides access to any information pursuant to his employment or contract or subcontract to the contractor with the United States Navy. ANY POSSIBLE IMPLIED WARRANTIES OF MERCHANTABILITY AND/OR FITNESS FOR PURPOSE ARE SPECIFICALLY DISCLAIMED.

MULTI-SKILLED WORK TEAMS IN A ZONE CONSTRUCTION ENVIRONMENT

BY

Dan Stravinski
Manager of Personnel Programs

Sational Steel and Shipbuilding Company

ABSTRACT

In order to address the problems inherent in a trade oriented production organization, and to develop a work force which will perform efficiently and effectively in a zone construction environment, NASSCO has proposed to deveiop semiautonomous, multi-skilled work teams.

The teams will be made up of a stable membership, be well trained, have multiple skills, and will have some degree of control over decisions necessary to complete work in their areas.

One supervisor, rather than individual trade supervisors will be responsible for completion of work within the area. Employee participation will be encouraged to the greatest possible extent. Although ultimate authority for decisions within the work area will remain with the supervisor, it is envisioned that the traditional role of supervision will shift in emphasis from "boss" to facilitator acting as liaison between the work team and other parts of the organization.

MULTI-SKILLED WORK TEAMS IN A ZONE CONSTRUCTION ENVIRONMENT

PRESENTATION TO THE NATIONAL SHIPBUILDING RESEARCH PROGRAM SYMPOSIUM

Thursday, September 12, 1985
Hyatt Regency Hotel, Long Beach, California

Good morning Ladies and Gentlemen my name is Dan Stravinski. I am Manager of Personnel Programs at National Steel and Shipbuilding Company and I am here to report on National Steel's experience with Multi-Skilled Work Teams in a Zone Construction Environment. A little background might help in understanding our experience. at NASSCO.

In about mid 1984 a request for proposal was distributed to members of the SP-5 Panel. The proposal had as its objective the development and testing of a new production work force organization that would fit the technical requirements of product oriented work breakdown structure - otherwise known as zone construction- This new production work force organization was to incorporate advantages claimed for multi-skilled, self-managing work teams. Elements of these teams included fairly continuous association of team members, multiple skills and some degree of self-management. The concept was one of some interest to NASSCO as we are in the process of converting from the conventional systems approach to shipbuilding to zone construction. The multiple skilled dimension of the work team presented a problem for us at the time the request for proposal was first received. Fortunately, NASSCO was preparing for negotiations with its 7 unions during the same time frame. Up until this time, our labor agreements were like many others; they provided for separate classifications, with well defined limits on what work these classifications could do.

NASSCO Management saw the necessity of allowing increased flexibility in the use of production trades if the full benefit of zone construction techniques was to be realized. To this end, a number of meetings were held with our Union representatives prior to negotiations to bring them up-to-date on the technological changes that were taking place in shipbuilding and he need for our work force organization to change accordingly. In order to further emphasize this point, a group of selected union representatives were invited to travel to Japan with members of NASSCO's production organization to view first hand the effectiveness of these techniques, as well as how they were accomplished.

Negotiations for new labor agreements began shortly after the group's return from Japan. Although there were many disagreements along the way, the parties approached the issues in a problem solving mode, such that each side at least understood the position of the other.

I would like to say that at the end of negotiations full agreement was reached on allowing increased flexibility within the production trades, however, this was not the case. The various unions involved were unable to agree on the details of our proposed understandings, therefore, the Company's position on work rule changes was included as a part of its final proposal to the unions to be voted upon by their membership.

Although complete agreement on work rule changes was not reached among

all of our unions, the Company's final proposal did attempt to address the concerns raised by our unions during discussions on the Company's proposed changes.

During these ‘negotiations our union representatives recognized the changes taking place in the shipbuilding industry and attempted to deal with the effects of these changes as best they could, while still protecting the interests of their members. We feel the final modifications to our work rules reflect the best thinking of both parties regarding this issue.

At this time, the Company, in addition to the changes in work rules, was proposing a wage freeze. The Company's final offer was voted down and a two week strike. ensued. After additional money was made a part of the Company's proposal, the offer was ratified and the strike ended. The Company's final position on work rules was unchanged and is now part of our labor agreements.

The basic changes in work rules negotiated by NASSCO were two-fold. First, changes were negotiated which would allow a tradesperson to perform work that was incidental to their normal trade - an example of this would be a pipefitter being allowed to use the welding/burning processes to cut pipe hangers to length and tack them into position.. In the past only welders could do this work. Other changes were more far reaching and involved the establishment of classifications which were much more broadly defined than those of the past. An example of this is the classification of outfitter. A member of this classification can perform any work of the pipefitter, outside machinist

or boiler machinist classifications, in addition to using the welding and burning processes on work incidental to their main task.

These changes were particularly important when viewed in the context of on-unit or on-block construction, where most work necessary to complete the unit or block would be performed in given area. NASSCO wanted individuals who could perform most, or all of the work associated with a given unit or block. The new work rules provided us with this flexibility. In addition to work rule changes agreed to in our 1984 labor negotiations, certain flexibility in assignments already existed in our labor agreements. For example, employees within our Ironworkers Union, who represent metal working trades in the yard could be temporarily assigned to perform the work of another classification for a limited period of time; also, shipfitters could be assigned to perform any welding or burning for which they were qualified. NASSCO was fortunate enough to have work on the books at the time these changes took place. Two tankers were being converted to hospital ships and an order had just been received from EXXON for two new oil tankers. Although some aspects of zone construction were to be used in completing the hospital ship contract it was contemplated that the construction of the EXXON tankers would be based entirely on the principles of zone construction. This transition reached from Engineering through Materials to the tradesperson in the yard. It included stage of construction working drawings, material installation instructions, and pallet material lists developed by teams of production planners and production staff engineers. Given this background it is not surprising that NASSCO submitted a proposal to examine multi-skilled work teams in a zone construction environment since we now had the capability of fully exploring the concept.

In devaloping our proposal, two factors on the human relations side were identified as inhibiting productivity in the American shipbuilding industry. The first of these factors was the traditional system design approach utilized by engineers., owners and regulatory agencies. This particular factor, of course, is addressed by moving to a zone construction method of shipbuilding.

The second factor, and one that we are concerned with in this instance, is the development of a work force which traditionally has been composed of highly specialized workers with a relatively narrow range of skills or duties. These two factors interact to produce low productivity for a number of reasons.

Vu Graph #1, First, a lead trade would have to cease work if a support trade was not available to perform a task incidental to the job. For example, at NASSCO if a pipefitter was performing his job but a welder was not available to cut pipe hangers and tack them in place, the pipefitter would be prevented from going any further on the job.

Secondly, significant wait time was experienced if the work of a lead trade and **a** support trade was not evenly distributed and coordinated. In the example of the pipefitter and pipe welder without good coordination, the welder may have spent most of his time idle, while the pipefitter was fitting the next run of pipe.

Thirdly, organization of work along trade lines resulted **in the** development of trade oriented supervision. This type of organization is not conducive to the development of a cooperative approach to getting

the job done. At times, supervision had to go through two different organizational levels before a common supervisor was reached who could resolve a conflict. Too frequently- emphasis was placed on having the work of one trade completed, regardless of how the performance of this work might impact another trade in the performance of its work.

Finally, trade orientation in the work force also results in excessive movement of man power. Employees of a given trade would be assigned to perform a task, and when that task was completed, they would be assigned to another vessel or area of the yard. This continual movement of man power was not conducive to the development of smooth working relationships, either among the trades themselves, or between a trade and their supervisor.

Vu Graph #2. In order to address these problems NASSCO proposed that seams be developed that would have stable membership, be multiskilled and well trained. A high degree of employee participation would be encouraged, and to the extent possible, the team would be responsible for decisions necessary to complete work in their area.

In order to eliminate difficulties associated with trade oriented supervision, one supervisor would be responsible for completion of work in the area. In the event technical assistance was required in a trade that the supervisor was not familiar with, a leadman or working foreman from that trade would provide such assistance.

It was envisioned that the role of the supervisor in charge would also change from that of "boss" to one of facilitator where they would

act as a liaison between the work team and other parts of the organization, such as Maintenance, Materials, etc. Ultimate authority would still rest with the supervisor.

In addition to the elements just described, the intent was to provide as much information to the team as possible, to make them fully aware of what was involved in the task before them.

It was hoped that having a team with a stable membership would allow the development of working relationships among team members which would increase production efficiency.

In order to make sure that employees had the necessary skills to come up with solutions to the problems they might encounter, training in problem solving would be provided. Through their participation it was hoped that team members would take greater ownership in the production process with increased productivity and job satisfaction the result.

Other companies and industries have successfully experimented with this approach, ranging from Volvo in Sweden to shipyards in Europe and automobile assembly plants in the United States.

In determining where such a team would operate, a site where the work process was discrete enough to examine was desired. The site also had to be one where some multi-skilling could take place. A steel assembly table was chosen for the initial team. The area referred to as Table 9 was designated to build mid-body sections for the EXXON

tankers with use of jigs and fixtures permanently installed in the area. It was felt that teams working on these units would have an opportunity to develop skills in the area of welding, burning, shipfitting, blueprint reading, layout and others.

In order to determine those individuals who would become team members, representatives of the Personnel Department submitted a list of names of individuals who had expressed interest in the project to the production superintendent in the area. Most of the individuals suggested had had previous experience in teams and small groups through the Company's Quality Circle Program. These lists were reviewed and modified, with the final selection of employees to work on the table being made by the production superintendent.

An initial group of employees were identified and assigned to the table, and as work picked up in the area, other individuals were assigned as needed. Second and third shifts were added later on. In order to have a true test of this different method of organization it was realized early on that all shifts had to be involved since it would be difficult to determine increases in productivity if not all employees working on the project were involved as team members.

Vu Graph #3. Once a core group of employees were identified, an orientation session was held to bring the participants up-to-date as to what the Company intended to do in this area and the employee's role in it. The orientation session was held off-site at a local hotel and included all of the trades which would be responsible for producing units on Table 9, as well as the supervision who would be

responsible for the area, and the project management team.

Details of the team operation, as well as the objectives of the project were covered. Employees were given some idea of the technical aspects of Table 9 operation, including how the work would flow through the area, and the jigs and fixtures which had been constructed to help produce the units in the area. Some training was conducted in communication and brainstorming skills, and a brainstorming session was held to identify initial issues of interest for the group. These included; shift turnover and coordination, training, safety, equipment issues, housekeeping, and the information they felt was required for them to complete their work in an efficient manner. Initial interviews were also conducted with the group to get some idea of how team members felt about being a part of the project and what they hoped to get out of it.

In all, seven hours on a Saturday were spent by team members in this orientation session. It was a very positive meeting with all involved indicating a desire to give the new organization a try and see how it worked.

Which raises the $64,000 Question - How has it worked? The immediate answer to that question is the jury is still out. The team has been in operation less than three months, with the 2nd shift only now becoming stable enough to have them begin operating as a part of the work team project. It has been quite a learning experience though. As with any new system, we had our share of miscommunication and foul-ups, however, most of them seem to be behind us now and the team is beginning to gel and get on with the task at hand.

We have a first shift crew of approximately 22 welders, shipfitters, and supervision. Each day a start-of-shift meeting is held to communicate pertinent information to team members, as well as to allow feedback from the team members to the supervisor conducting the meeting. In addition to these start-up meetings, a one hour meeting is held each week to discuss issues of concern to the team, as well as to provide training in problem solving and other aspects of group dynamics and technical training.

One supervisor is in charge of the team. We are fortunate to have the individual who was chosen as supervisor for this area in that he is open to new methods of organization after having spent six months in Japan observing ship construction methods in their yards and observing work force organization there.

Vu Graph #4. The work team has been as stable as teams of this nature get in shipbuilding, in that most of the members who were present at our Saturday orientation session in June 1985, are still with the team. Due to fluctuating man power requirements on the table, there are times when team members are assigned to different areas in the yard, however, we have been successful in having these employees returned to the table at such time work is again available for them.

An attempt has been made to encourage employee participation on the part of team members. Information regarding schedules, stage plans and blueprints have been made available to team members for their review. A chalkboard has been put up in the area to allow communication between shifts and a bulletin board has been added to allow posting of information pertinent to the team.

Vu Graph #5 . A number of suggestions have been made by team members to help the team become more efficient, such as having team members paired as a work group within the team so that over a period of time a smooth working relationship could be developed, with increased productivity and job satisfaction the result.

A suggestion was made to have members work on a unit from the fabrication of web frames on until the unit is complete so the work is less monotonous and the people have a better idea of what it is they are constructing.

Team members have also suggested that attempts be made to limit re-assignment of individuals from Tabie 9 to other areas of the yard by having them perform work in other classifications. For example a welder might be assigned to shipfitting work or a shipfitter to welding.

These suggestions fit in well with our objective of providing employees in the area with multiple skills. Welders have been assigned to shipfitting tasks and shipfitters have been assigned to welding tasks in order to bring their skills up to par in these areas, as well as to limit the amount of re-assignment required depending on work load.

addition to the on-the-job training just described, classroom training is also being offered. The Company has ongoing blueprint reading classes which team members are encouraged to attend. To date approximately five individuals have taken advantage of this opportunity, Team members have been provided with some training in problem solving with more to come. Additional training will take place as needs are defined.

In order to give them a 'better idea of the context in which their work is taking place a suggestion was also made to have a video tape made of completed units being erected so that team members can see where their product is being utilized in the construction of the ship, as well as to document any problems caused by inaccurate work.

The autonomy of team members is a subject that is still being explored with no firm ground rules yet established. A good deal of autonomy was given the initial group of employees assigned to the Table 9 area, however, as other shifts were added and the production process became more complex significant autonomy was more difficult to allow.

Team members have expressed a desire for greater say in how the job is accomplished, who they work with, and what assignments they must undertake. A process has been established to attempt to resolve some of these questions. Team members are encouraged to bring up questions of this type in our one hour meeting each week and at that time responses are provided immediately as to what the Company is willing to do, or the issue is reviewed and a response is provided at the following meeting.

Vu Graph #6. The one hour meetings have proven to -be a challenging aspect of team operation. A number of issues have been brought up that needed to be dealt with prior to the time members actually felt willing to move forward with the process. As you would expect, some of these issues were physical needs, ranging from lockers, to having time clocks placed in a more convenient area. Other issues included clarification of the role supervision was to play on the table.

team members apparently expected a greater degree of autonomy and much less supervision than what is actually taking place. The question of incentives has been raised. Some individuals on the team feel that if the Company is expecting them to perform work in a different manner, or take on more responsibility, that they should, in turn, be rewarded for their efforts. Problems have arisen due to the vagaries of production itself, such as; late material, or problems with other shifts screwing up a job requiring rework by 1st shift. One of the more disruptive situations occurred when the regular supervisor in the area took a week off to get married, and the individual who took his place was not properly oriented as to the ground rules for team operation and the relationship between team members and supervision in the area. As the result of this, some team members felt betrayed and some time had to pass before they were again willing to work as team members.

Other issues have been raised as well. Team members have expressed concern that by blazing the trail of multi-skilling they would, in turn, be blamed by their co-workers for developing a work process which would eliminate jobs. Our Ironworker's Union has some concern for this reason as well.

Although representatives of the Ironworker's Union were invited to attend the initial orientation session, as well as some of our one hour weekly training sessions, they have chosen not to.

One member of the team is the Union Shop Steward for Table 9. He has been involved from the start and has run hot and cold in his

contribution. to the effort. On the one hand I believe he sees **some** positive outcomes possible from this project, but yet he is very concerned about the possible adverse effects on members he represents from multi-skilling, etc.

If the question were asked - What have we accomplished? I would have to reply "We do not know yet." As far as productivity increases are concerned, it is much too soon to tell. I had indicated some problems had been experienced in late material, rework caused by other shifts, and problems from our Engineering Department.

We are also dealing with a combination of technical and social changes in this area, in that not only have we introduced the team concept into the production process, but we have also begun constructing units in this area in a manner different than that attempted before. Sorting out the effects of these dual changes will be difficult to do. We intend to monitor activity in this area to determine how far up the learning curve we are able to travel, and we hope that once we have additional experience in the area, substantial productivity improvements will have taken place.

Employee attitudes are another area where we hope. to measure some improvement. Although there has been some rocky areas in the team's development, for the most all individuals have been positive and have expressed a willingness to give it a go. Team members seem interested in information about the work they are doing and how it is done, as well as how it fits with the rest of the organization. There has been good participation to date in our meetings and with each meeting the results seem-to be more positive than the last. At one point

a question existed as to whether or not employees had to stay on the team if they were not interested in doing so. At that point an option was granted to the employees if they wanted to leave the team they could, and out of 20 members only two chose to go back to their previous work area.

Vu Graph #7. Again, I would emphasize that the team is very much in the beginning stages of its operation and we have much yet to learn. If I were to pass on those things we have learned already, I would emphasize three in particular. The first is that everyone must be clear on the ground rules, game plan , and objectives of l any reorganization of the type just described. People's expectations have a habit of getting raised beyond what they should be and if the ground rules, game plan, and objectives are not very clear a good deal of resentment can be the result.

Secondly, do not expect results over night. The development of a smooth working team takes a good deal of investment in time and effort. When individuals have never been given a say in their work are asked t o suddenly participate, be prepared to have discussion on lockers, incentives, and a host of other things that may be bugging them before "they will. be willing to invest effort in improving production efficiency.

Thirdly, I would recommend the use of volunteers in any project of this type. It is difficult enough to attempt change in an organization with everything on your side. The task should not be made more difficult by beginning with individuals with little or no interest

in what you are trying to do. Use of volunteers assures you of a willing group to work with, with some interest in the outcome of the project.

We are looking forward to watching the development of this team and participating in it. If we, as a Company, are able to follow through on the commitments that we have made to make the team work, I am confident that employees who are the heart of this team will do their part to make it a success as well.

JS/j
$22
9-24-85