



TODD PACIFIC SHIPYARDS CORPORATION

FINAL REPORT – PROJECT RESULTS

FOR THE NSRP PROJECT

Five S – Applications and Education Program for Shipyards

Technology Investment Agreement between ATI and Todd Pacific Shipyards Corporation
(Agreement number 2000930, dated 4/17/2000)

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Title

Five S – Applications and Education Program for Shipyards
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Executive Overview

Five S is an implementation methodology for workplace organization that has been widely used in many industries.

Purpose and Goals

The purpose of this project was to create an incentive for U.S. yards to adopt a Five S culture and assist them in developing and maintaining that culture. The goals of the project were to show successful implementation of Five S at two US Shipyards and to use those implementations to develop an implementation guideline specific to shipyard operations.

Results and Accomplishments

The project was highly successful. At Todd Pacific Shipyards, eight workshops were completed. These workshops showed returns of up to 30% reduction of cycle time of the targeted processes. The installations were sustained from the time of implementation to present. The shipyard used the success of these programs as the basis for a management decision to vastly increase the scope of the implementation. Similar results occurred at Atlantic Marine.

Significance of Results to the Industry

Publication of the guidelines, technical reports and industry workshops generated a high level of interest on the part of other shipyards. Several U.S. shipyards have initiated similar programs in the last year.

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Collaborators

Atlantic Marine Holding Company was a project partner and has utilized the Five S methodology in all four of their shipyards. They are continuing the program at a rate equal to Todd Pacific Shipyards implementation.

V2R Consulting Group was the technical consultant on the project and a subcontractor. They continue to assist Atlantic Marine Holding Co. and Todd Pacific Shipyards with the implementation.

Description of Methodology

The term “Five S” originated in Japan. The Japanese discovered that a key element of their Total Quality movement was paying close attention to the state of the workplace itself. They developed a system to enhance the workplace defined by key words roughly translated as:

1. **Sorting** - Sorting involves separating the needed from the not needed. When there is clutter and confusion in the work area it is difficult to move quickly and smoothly.
2. **Simplifying** - Simplifying involves ensuring that there is a place for everything and everything is in its place. Participants define their process in order for organization to occur. Then items that are needed for work to progress can be structured/ stored so that they are a short distance from the work area.
3. **Systematic Cleaning** - Systematic Cleaning involves ensuring that the area is neat and ready for inspection. It frequently starts with routine checks – ranging from shop orderliness to preventive maintenance. Once these routines are established, abnormal conditions are recognized and acted upon.
4. **Standardizing** - Standardizing involves the implementation of common processes and methods for consistency. Reliable standards for workplace organization are used throughout similar work areas. Standardizing includes but is not limited to consistent storage solutions, consistent production processes and consistent introduction of changes to the area.
5. **Sustaining** - Sustaining efforts involve maintenance of the gains made and constant improvement upon them. The ultimate goal of sustaining is to change the mindset of all the people who work in an area so that they anticipate and prevent problems and identify and implement improvements.

The basic model for implementation includes an initial assessment, overviews and education for the organization. Based on this assessment, the organization should develop a strategy and schedule for the rapid improvement workshops.

The implementation of Five S is accomplished through a series of well-designed Rapid Improvement Workshops. Workshops:

- ❖ Are focused efforts
- ❖ Use dedicated resources for one or two weeks
- ❖ Utilize rapid education that is focused and brief
- ❖ Develop a vision for the areas conceived by the workshop team
- ❖ Involve explicit actions that must be completed during the workshop
- ❖ Have managers and associates work side by side
- ❖ Changes are made during the workshop – not after.

Resources Needed

Materials and Equipment

Depending on the state of your facility, minimal materials and equipment are needed for this project. This is not a technology project. Generally the installations are limited to specialized storage units, labeling, or ergonomic assists such as reels for air hose or other lead.

Software applications

Not applicable

Manning

Generally, the focused workshops require that manning normally dedicated to production be refocused on the workshop. Therefore, for several weeks the target area must either significantly reduce or completely forego production. Alternatively, the manning can be increased to handle both the workshop and the normal production load. If at all possible, it is recommended to forego production or to schedule the workshop so that production can be significantly reduced during that time frame. It is also recommended that, if the organization does increase manning, that the most experienced people be dedicated to the workshop.

Training

For every two weeks of workshops, the organization should plan on 2 days of training for the workshop participants. The purpose of this training is to teach the underlying concepts to the workshop participants and also to plan out the changes that are to take place.

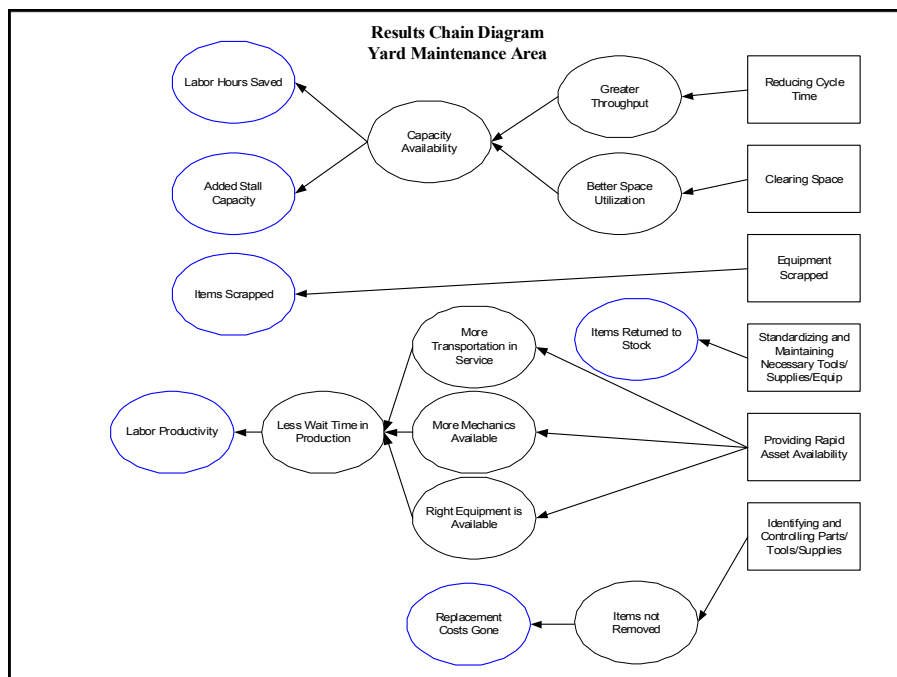
Consultants

It is highly recommended to begin this process with a highly qualified consultant. Depending on the level of technology transfer and the dedication of resources, an organization can expect to wean themselves of the consultant's assistance in 6 months.

Evaluation and Analysis Methods

Results Chain Diagram Methodology

Results Chain Diagrams are a cause and effect mapping tool used to evaluate and illustrate how known changes could be related to dollars saved. The following diagram shows the logic process used for determining where process improvement resulted in quantifiable savings. It functions rather like a cause and effect diagram. The boxes on the right hand side of the page represent the changes we know occurred (i.e. cycle time reduction, increase of available space, standardization of processes, etc.). The circles represent outcomes or effects of the change. The process is followed through a logical sequence until an effect is identified that can be tied to dollar valuation.



Cycle time analysis is a process mapping tool that was used to quantify savings identified in the Results Chain Diagrams. Cycle time analysis calculates the linear time spent in standard activities. Experienced shop personnel map every action taken to do job set up; job activity and job clean up. No activity is excluded, non-value added time is captured as discrete activities. Each activity is assigned a time. The workshop targets the non-value-added activity. After the 5S workshop, the same crew analyzes what has changed in their work practices (which activities have been eliminated and which have been reduced). The difference in the linear time is the cycle time improvement.

Time Estimate

The initial estimate for the project was 18 months. This amount of time was adequate to get a base installation in place. However, to completely cover every physical area of the yard a more realistic estimate for another shipyard would be a minimum of 36 months or 3 years.

The basic program can be 90% implemented as presented, however, each shipyard must conduct its own up front assessment and develop its own strategy based on this assessment. This is the most critical aspect of the program and cannot be omitted

Limitations or Constraints

The following “Twelve Examples of How Five S Can Fail” best summarizes potential limitations to success.

1. House Keeping Mentality.
2. Funding Is Not Available.
3. No Management Support.
4. Work Area Employees Are Not Included.
5. Work Design Not Considered.
6. Structure Is Not In Place. Structure includes:
 - a) The budget.
 - b) An internal knowledge base of Five S.
 - c) The management structure to foster rapid deployment and hold the gains.
 - d) The communication forums and channels for continued support.
 - e) A formal methodology for implementation.
 - f) A strategy of how implementation and sustaining will occur.
7. Underestimating Workshop Size (# of People Involved) and Cost.
8. Inexperienced Workshop Team Membership.
9. No Process for Change.
10. No Continuous Improvement Framework.
11. Cost/Benefit Not Considered.
12. The Tyranny of Production.

The following were the necessary conditions to implement at Todd Pacific Shipyards. Dedicated resources in the form of workshop leaders, consultant training; willingness to shut down shops temporarily during rapid improvement workshops; and management focus and interest on a level with production. These conditions are absolutely critical for any shipyard implementing the program

Any shipyard or any company could apply this program.

Major Impacts on Shipyard

As a result of this program, the company feels that it is in their best interest to use the methodology known as “lean manufacturing” (of which Five S is one tool) to be the vehicle for all process improvement. Investment in this program over the next 5 years will dwarf the initial investment of our Five S program. An entire department has been created to carry this program forward. We expect to easily see 20% reductions or more in our cycle time and direct cost of jobs.

Cost Benefit Analysis/ROI

After each workshop, informal cost benefit analyses were conducted with shop personnel. Returns remained consistent with what we found in the pilot workshop. The shops generally saw a 30% reduction in set up time for work on board the ship and a significant reduction in down time for their people once the job was underway. All shops have avidly pursued continuous process improvement. The best example of this is welder maintenance where equipment projection has been consolidated from 30 crane picks to one.

Lessons Learned

Training (Todd)

We needed to be flexible with our training and adapt it as our program evolved.

Planning (Todd)

We underestimated the magnitude of planning that was needed, for ship repair, storage and equipment handling mechanisms are unique, often custom-fabricated and require greater lead-time.

Staffing (Todd)

The staffing devised at the beginning of the project was inadequate for creating strong forward momentum of the program. In response, Todd has established a Lean Department with a Director and a full time staff.

Sustaining (Todd)

Inadequate time was spent up front in the project strategizing the process for sustaining the changes that had been put in place..

Communication (Todd)

Todd did not develop and implement a formal communication plan. One outcome was that workshops were more laborious and results not sustained as well as they could be.

Strategy (Todd)

We benefited tremendously from thinking through our business structure and devising a comprehensive deployment strategy.

The Big Picture (Todd)

About midway through the program we recognized our failure to take an overall look at our operations and determine which processes were most important in adding value to our work.

Ownership (Atlantic)

We learned that when areas of common ownership are established, no one is willing to take responsibility for that area. Most importantly, no matter how beneficial an idea might seem to management or an outside consultant, the ideas which will have the most effortless success will be those which the craft workers develop on their own.

Technology Transfer

Methods for follow-up to ensure the project is working in your shipyard

More can be said on this subject than there is room for in this document. However, do not let the brevity of this explanation be an indicator of the importance of this step. Follow up and sustaining are as critical as initial strategy development. A simple explanation follows.

Maintaining momentum and attention is accomplished by daily reinforcement from management and those using the system. Area checks should occur daily; improvement ideas should be evaluated and implemented weekly, and area assessments should be performed monthly. Follow up is the first step in sustaining. More information on developing a comprehensive plan for sustaining can be found in the Guidelines document Section 10.0 “Sustaining” and in Section 11.0 “Structure for Change”.

In addition, the following “Ten Secrets of Success” are from the Guidelines document

- 1) The project begins and ends with good planning.
- 2) There must be an investment mentality.
- 3) Remaining principle based will ensure success.
- 4) Relate local improvements to the big picture.
- 5) Force coherence.
- 6) Implementation will be difficult without a structure.
- 7) Gather the information from the people doing the work.
- 8) Don’t substitute money for brains.
- 9) The solutions must be easier – focus on how to make ideas work.
- 10) Lead by example.

How are you sharing this information with others in the industry?

At least four presentations were provided at various industry gatherings. On site tours at the end of the project were provided to the ECB and to NSRP Ship Production Panel members who were interested. Before and after pictures were posted on the NSRP web site. A complete implementation guideline was published and posted on the web in preliminary form for over one year. The Final Guideline document (a comprehensive implementation manual) will be available for sale through our consultant, V2R Consulting Group (contact information posted on the NSRP web site).