

PLANNING AND ORGANIZATION OF PRODUCTION IN THE SHIPYARDS

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Abstract: *Despite the situation of overproduction and low cost transport new ship orders worldwide bloom for the first time after a long period of decline, driven by an efficient design and low prices on new construction. Owners invest in ships with new design energy efficient to reduce transport costs and to increase revenue. Accordingly, planning and organization of production in the shipyards plays a strategic role in the further development on this market. In this paper the authors will present complex production process in a shipyard and the main problems they face.*

Key-words: *production, shipyard, planning*

INTRODUCTION

European maritime technology industry is globally recognized as having the highest quality, innovative design and efficient and timely delivery. The industry is challenged due to lack of financing from banks for new construction in Europe, while overseas availability for larger credit schemes and government actions support the growth of their industry. Economic and financial crisis still challenge European maritime technology industry. In October last year the IMF reduced its growth rate estimates of international and global trade profit for 2014. During 2013 the demand for new ships has increased, however there is an element of skepticism about the industry that leaves behind during the crisis.

It is expected that continuous innovation and new environmental regulations have benefited from the European maritime industry (shipyards and equipment suppliers).

Manufacturers of European maritime technology involved in delivering green solutions as a means to capitalize the vast growth and jobs in the safest and most efficient way possible.

MANAGEMENT OF OPERATION

Management of process aims activity that is easily maintained by controlling production processes are regulated by time planning and focusing product, prioritizing compliance work process sequence. The goal of management is to be quality in minimum time and the results satisfy the following process.

On the other hand operation management objective is an activity whose potential economic factor and whose efficiency is systematically studied, monitored, and people's work is reviewed. The goal is minimal cost and improving the production outcome.

In a shipyard when contracting a new project owner is established with several key data such as:

- First contractual date on which the ship must be delivered. Depending on the time it goes in reverse order establishing the following data in this way is called Backward Schedule.

- Delivery time - this time put earlier than the contract just to get a margin of error, where delays can be modified on site without losing money.

- Release date - this is the date on which the ship may dock exit and move to the quay I continue to work there.

- Keeling date - this is the date that the first block is placed in the dock.

- Date of Start cutting - the date of the first cut sheet for boat.

The owner always delivers some important part of the total amount for the ship and once established company accounts data without the shipowner can not make changes. Buffer is called the waiting time between two or more processes. The two types of buffer planning, project and process. Buffer does not affect the loading yard project at the time when the influence process loads. Always at the beginning of a project is determined on each activity times larger buffer delays precisely when there is sufficient

recovery time without changing important data from the project (Key Events). If delays are large and have made changes Key Events owner is contacted to discuss with him and communicated the new data explaining why it is late.

Always take a project buffer, the date of delivery is long before the contractual delivery date in order to avoid situations where the ship is not ready on time and shipyard in this case undertakes to pay large penalties for each day of delay.

When the data were established by the Strategy Team are handed over to Design who need around a year to do all the designs for buildings, systems, to set block division, progress assembly and erection retail network. Planning the same time from start to establish the sequence of activities and blocks depending on the type ship.

Depending on the placement of data blocks and start working on design drawings, to establish shelters where they can assemble the blocks, where the paint and all the details on weight and size. Planning activities for a vessel is divided into two categories, the building and the dock.

The order of block is simple, for each block following tasks take place:

- Cutting (cutting board);
- Assembly (the block assembly);
- Preoutfitting (the specific block pipes and cables);
- Painting (blasting and painting of the building),
- Pre installation (when two or more blocks form a super block);
- Assembly (actual welding blocks and super blocks between them in dock);
- Hull Painting (the painting of a super block or area).

To schedule dock is a bit more complicated because here they speak mainly of systems and everything related to the ship. This chart is only after discussing with production and reach a consensus on activities.

At the beginning of each project is a standard plan as you begin to implement change. Product volume is much smaller than the plan and costs are much higher. In this case there are two possibilities:

- Updating the plan (Rolling Plan). Issuing of 2 in 2 months a new plan, meaning that it recalculates blocks delayed in the near future. What has been done and finished registered in the system and does not alter the rest moves in the future.

- Corrective Action (recovery delays). When a segment is very large delays and therefore are subject to change Event Key sites can not deliver or ship to transfer personal time worker from another division to help overcome the delays.

Therefore the most important concepts that go into planning a shipyard are:

- Just in Time - teaching work or project when he writes in the contract, nothing is ready sooner if you do not need and can not process immediately after take. This site should be maintained because of the money being

contracted for a certain time owner does not need it than the date of the contract refuses to take it up then. Or another second case, the ship is not ready at the time of the contract and for each day late penalties are paid huge.

- Lead time standard was designed based on old projects in the shipyard. Blocks were observed during winter and summer in order to establish a standard for the two seasons.

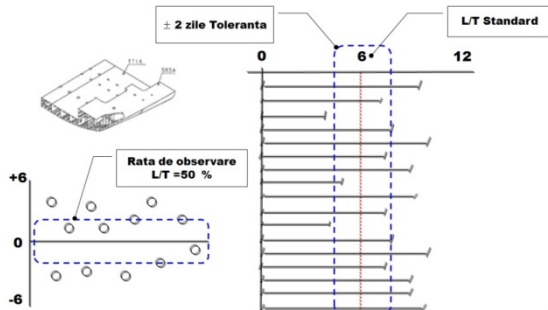


Figure no 1 Achieving of the standard

Strategy & Planning Division Team deals with the distribution of all hours in all activities of the shipyard, also with the distribution of hours depending on how much labor in each division there is a charge and establishes the necessary man power for each division.

At the beginning of each project owner is established with a number of hours required to build a ship, depending on the size and complexity. At this number of hours is calculated workload which then divides on each high activity (SG), after discussing the Design Division as they may calculate the work volume for each block and Activity.

Before calculating the hours and sharing a project budget are established key dates of the ship. This data is set according to the type of vessel and its complexity, the date on which the owner has contracted the first charter. Before any planning must determine the critical path. The critical path is to identify activities that influence decisively the total duration necessary for the complex process analysis. There are certain activities that can not be delayed because it would delay the whole process. If some can be moved a few days others may not even one day.

To respect the planning phase is important first to identify the critical path of a project. This road is identified only by means of Backward Schedule, that it starts from the anticipated date of final and go back and calculate until you cut the first board ship.

Another important aspect that should not be overlooked in planning is the bottleneck. Restricting activity throughout the entire process ability.

Capacity in naval construction industry has two coordinates:

- Fixed (facilities):
 - Cutting: Cutting speed machine
 - Assembly: work areas
 - PO install: work areas
 - Sandblasting: Sandblasting halls
 - Pre-assembly: work areas
- Variables (labor)

The labor force is considered variable: the charging function can call the reallocation (Outside worker), overtime (OT) or dismissal.

Calculation of a work, the number of blocks generated from the work area:

$$EA = \text{Working Areas} / \text{Lead time} * \text{Working Period}$$

Lead time has several components. Some bring value and actual activity for which customers pay and the other without value, but are required, without them you can not do business with value.

The main components of LT (Lead Time) are: queue time (waiting time in sequence), setup time (for training), cycle time (uptime), wait time (waiting time), move time (for transport).

Conclusions

The only time that brings value Cycle Time, the time that is welded, the rest of time helps to achieve, because only welding activity is charged. Although the activity can last one day lead time is calculated from the beginning until the end of the process.

Efficiency is a system of production capacity to produce greater benefits than costs, the profit. This is calculated:

$$PCE = \text{time that brings value} / \text{total time} * 100$$

Before distributing hours is conceived by an Erection Network Planning Team and a Block Schedule for each project. Erection Network shows the sequence of blocks to be put in the dock to be respected.

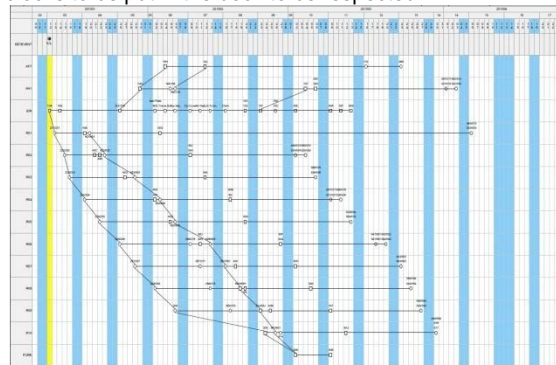


Figure no 2 Erection Network

Middle Term is "product" that the Planning Group shall deliver every two months. He refers to all divisions of production and loading presents itself throughout the site. To achieve this calculation is simple: the number of monthly hours divided by the number of people in that division and result in a need for M/P (Power Man). If there is insufficient labor when there are few ways to fill the gap:

- Employment of people, this solution is used only if the coming months and load is very high
- Bringing people from other sub-division where

Loading

- Sending the outsourcing of certain works
- Changing the internal schedule and moving works that are not so urgent in the next month, that where there is a month with overload and the next not.

After establishing sequence conceive Block Schedule and contains each block separately showing the main activities taking place (cutting, assembly, installation, painting, pre-assembly, assembly).

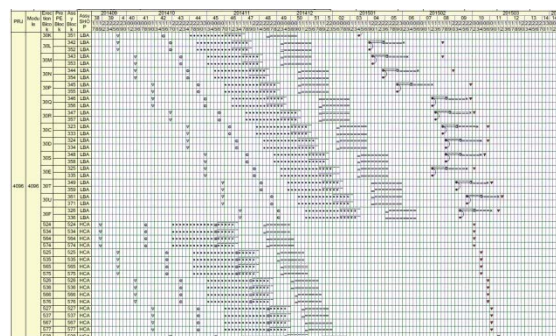


Figure no 3 Block Schedule

These two graphs helps distribute hours because after their design graphs helps distribute hours because after their design data extracted from the program and start charging itself. Any changes are discussed before the design and production that sets your home - pending final blocks, they alone can tell when a block is taught according to the workforce they have and what is urgently to be completed and all the data does not change the process.

In a complex production process as the ship construction, planning is of major importance to ensure constructive collaboration between organizations. The result of all activities in a shipyard is measured based on three major indicators: quality, quantity and delivery time which means that they must deliver a certain number of products, at a certain level of quality and at a time. A production system consists of two major structures and operation process and aims at transforming inserted in the production of goods required by the client.

The results of the system:

- Effectiveness - the ability of a production system to produce a product / specific effect;
- Efficiency - a system of production capacity to produce greater benefits than costs, the profit.

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