

## METHODS OF IMPROVING THE PROFIT FOR THE OFFSHORE PATROL VESSELS

### Andreea Chitic

"Dunărea de Jos" University of Galati,  
Faculty of Naval Architecture,  
47 Domnească Street, 800008, Romania  
E-mail: chitic.andreea24@yahoo.com

### Renardo Florin Teodor

"Dunărea de Jos" University of Galati,  
Faculty of Naval Architecture,  
47 Domnească Street, 800008, Romania  
E-mail: Florin.Teodor@ugal.ro

### ABSTRACT

*In order to study the Naval Offshore patrol project built by the Dutch company Damen, which can supply on request various ships, covering a wide range of type-dimensional and functional : OPV950, 1000, 1400, 1800, 2400, 2600.*

**Keywords:** Improving economic efficiency

### 1. INTRODUCTION

For example, the Offshore Patrol Vessel 1800 is highlighted by the following particularities:



#### ***High speed and low fuel consumption***

OPV 2 was designed with an Axe-bow hull, giving the properties of reaching speeds up to 26 knots. Because Damen's Axe bow hull was designed to have a low water resistance, the vessel has also a very low fuel consumption.

#### ***Perfect life conditions on board***

Another feature is the comfort given by the same Axe-Bow structure. Having a special hull design, the vertical acceleration was reduced till 1.3G notice during the multiple tests made at sea, in all kinds of weather conditions.

#### ***Technical flexibility***

Having multi-purpose features, the vessel takes technical flexibility up to a new challenge. Equipped with a state of the art equipment and increased attention for the main deck. This offshore patrol vessel is capable of going onto missions with dedicated equipment onboard. The vessel is design to patrol on missions having humanitarian purposes or against piracy, sea drugs dealers operations, etc. At the same time she can be used to search and rescue, the helideck giving support in this case.

Next, we will deal with the Offshore Patrol Vessel 1400, a project that includes a series of four ships. Due to its design, such a vessel comes with a wide range of improvements, especially for facilitating surveillance operations in regions where there is a high level of danger. These ships are optimized to perform their tasks, as much for security, safety and humanitarian.



## 2. BUILDING STEPS

The important construction steps are usually correlated with the payment steps. The payment steps are named "milestone", a term that is taken from English, being accepted by all users.

Therefore, a milestone represents a payment stage established from the beginning of the contract between the two parties, the shipyard and the customer respectively. These steps are respected by the shipyard, because it is important that payments be done in time by the customer.

A fabrication structure based on milestones is presented in the following way:

### *Start cutting and steel processing*

Represent the first day of the production process by cutting the first steel plate and profiles necessary to build the keel.

### *Laying the keel*

For the purpose of applying the IMO Convention, the steel construction will be identified with the completion of the first double-bottom section containing the keel (bottom of the ship).

The steel construction has to be at least 50 tones or 1% of the weight of the structural parts, whichever is the smaller.

### *Placing the main engines*

It represents the constructive and implicit payment stage that marks the beginning of constructing the engine room. This moment actually gives rise to a whole process of assembly, welding, saturation, blasting and painting everything related to the engine room.

### *Launching*

It represents the stage that makes the difference between the hull sections or the hull blocks and a floating hull body.

The launching can be done gravitationally on the inclined plane, or in the doc. Obviously, the launching of the doc has many advantages in terms of saturation of the ship before launching. The launching took place for the first two ships in the dock and gravitationally on the slipway for the last two ships in the series.

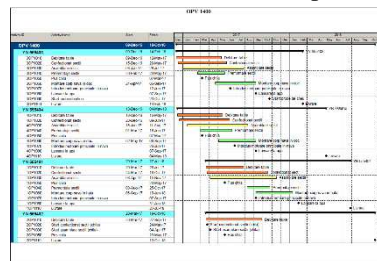
### *Commissioning*

Commissioning is a process where there are tested all the piping installations, equipments and electrical installations.

### *Delivery*

The ship is delivered after sea trials. Very important is to fulfil all contractual statements in order to give satisfaction to the client related to the ship which he will get it.

The Gantt chart of the four ships in series



In the graph you can see the milestones represented as duration and dependence on each other.

**Construction features**

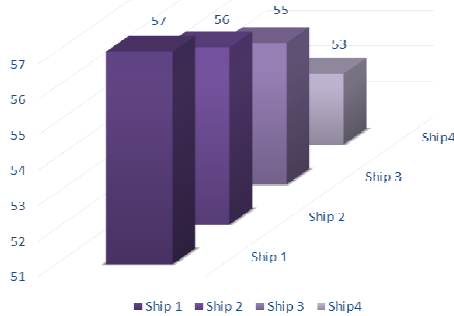
The first two ships had the same starting date for cutting and steel processing and were launched in the same time. Subsequently, the second vessel had a controlled period of stagnation, given the delivery date different from the first ship.

Until the launching the production worked simultaneously on the both ships, which led to a considerable economy of man-hours.

The next two ships were built a few months after the first two and a few months between them, using the same workforce that worked on the previous ships. As a disadvantage, we identify their launching on the slipway, which led to docking for mounting the stabilizers and propeller blades. These were not fitted before launching to avoid contact with the launching cradles. Docking caused the stagnation of other ship activities due to specific docking restrictions.

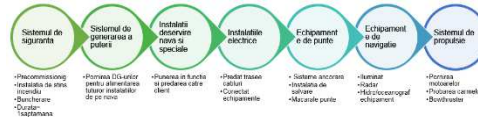
From ship to ship, the cost optimization was followed for both construction and commissioning stages. Starting with the second ship of the series, the experience resulted from the repetition of the works on the previous ships start bringing improvements, therefore the losses in materials and labour were avoided, in particular by implementing the incipient revisions and reducing the time per operation, which led to the progressive decrease of the fabrication duration and respectively substantial profit growth per ship.

We see in the next chart the evolution of the fabrication time of the four ships.



It started from a 57-week period at the first ship, reaching the last ship at a fabrication time only of 53 weeks.

Testing of these vessels was carried out by passing the two main stages, commissioning and sea trials, according to the following pattern:



**3. IMPROVING THE PROFIT**

Price = Cost + Profit;

If: Profit ↑ then: Cost ↓

Considering the ship price limited by the shipbuilding market, it results that maximizing profits can only be done lowering costs.

The shipyard will always try to increase ship-to-ship profits, especially as they are series, so savings can be made in terms of:

**A. Organization**

A good organization of the commissioning stage determines the discovery of the qualities of each member of the team and their distribution on the installations, which brings the maximum productivity value, thus improving the production process for the serial ships.



### **B. Knowhow = Use of the same workforce**

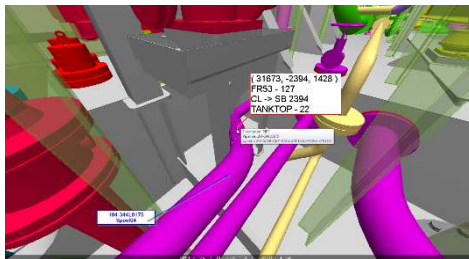
The support team for the commissioning specialists will be the same for all the ship series so that it can create the precedent of knowing the diagrams, the operating principles of all the installations so as to reduce the ship's commissioning time.

### **C. Avoiding unexpected costs**

Any design or incompatibility issue between the system and the aggregate will be observed and resolved from the first ship in the series, making it an advantage for the other three ships in the series, reducing the time and cost of commissioning.

### **D. Timely revision of documentation**

Carrying out revisions and implementing them in the documentation generates a saving of about 10-15 percent of the man-hour consumed on the piping for each of the last three ships in the series.



## **4. CONCLUSIONS**

Projects that contains several identical vessels have since the beginning the advan-

tage in increasing continually the profit, starting with the second ship in the series.

It is available for design, purchase, production and commissioning, too.

Important in this scenario is to put in practice the previous experience gained at the first ship in the series related to:

- *Organization*
- *Knowhow = use of the same workforce,*
- *Avoiding unexpected costs*
- *Timely implementation of revisions in documentation*

Therefore, following this logic, we can see that the last ship in the series will always get the highest profit, leading to the final conclusion that those projects with many identical ships have a big advantaged in improving the financial results, comparing with a project having one ship only.

## **Acknowledgements**

The research was supported by the Research Centre of the Naval Architecture Faculty, in "Dunarea de Jos" University of Galati, which is greatly acknowledged.

## **REFERENCES**

- [1] <http://www.damen.com/>

*Paper received on December 31<sup>th</sup>, 2017*