HMA Business & Sales

National Workshop 2011

Challenges and problems in connection with IAS and PMS control

HØGLUND Marine Automation AS

INDEX

1 Introduction

1.1 General

HMA has over the years experienced that important technical questions which normally should have been highlighted and found an answer to, in the preliminary technical negotiations between the yard/owner and the subcontractor, more often comes to light onboard the vessel during operation and maintenance.

We do also see that many questions might have been clarified and solved through more distinct regulations, and that the regulations is not necessarily adopted to fit the final complex system, such as gas propulsion plants, or extensive use of Programmable Logic Controllers (PLC`s). The many sub-contractors uses different PLC`s manufacturers in their systems. There are no uniform installation or platform throughout the whole vessel, which will soon become a tremendous maintenance problem. This should be treated as a main concern both by owner, operator and The Norwegian Ship Owners Association. So far it has not.

1.2 Intention and scope

HMA wishes to use this workshop to create a common platform for the participants where we like to discuss some of the core questions involving Diesel Electric propulsion, Gas propulsion, DP2/3, NOx emission, UPS`s, PLC`s and finally Building Specifications.

These questions that we like to raise have over the last few years become more and more significant, not only due to building of highly sophisticated and technical advanced vessels in Norway, but also because of the fact that technical core competence in higher extent disappear from shipping companies and yards, and may be unconsciously transferred to sub-contractors and manufacturers. In addition several of these vessels are built abroad were we likely will find yards without this core competence. However it is likely to believe that the owners expect the yards to hold such competence and use it for the best of the project, which is often not the case. If it is not thoroughly specified in the contract the yard will avoid to do so due to lack of skills and founding through the project. This situation is definitely price driven.

Every manufacturer or sub-contractor delivers their own equipment with little or none focus at all on the use and operation of the total installed system. However most of these suppliers have a possibility to connect to external sources with standard or none standard protocols. Even though systems can interconnect, often no one is actually contractually in charge of integrating these different systems. This role is more and more important and must be considered essential in any project implementation. Unfortunately we often see ship owners and yards not focusing on integration in the contractual phase, and therefore it is obviously left out also in the project phase.

It is our opinion that a cause to success is to understand the necessity of integration in marine projects, for new build vessels as well as upgrade of older vessels.

We would like to throw light on this through our workshop session.

2 Diesel Electric Propulsion

Our experience is that Diesel Electric Propulsion create challenges and problems for those ship owners that has installed and started to use such systems.

There are many different ways to connect generators and consumers and often wrong configuration is chosen, such as wrong load sharing mode, voltage level, size of generators, switchboard configuration, motor drives and so on.

In principle a new discipline has come to the surface; **Diesel Electric Propulsion.**

In to this concept many complex systems is forced to interact, and therefore the chance to fail is high. A very few of the ship owners has really good or excellent knowledge in this area. We believe there is a great need for more information in this special field;

HMA wishes to throw light on the following items;

- DROOP/ISOCRON load sharing. Advantages and disadvantages. What is the correct choice?
- Closed bus in DP2. Approval, equipment requirement, economy (savings) and risk.
- Which voltage level to select. We will discuss the HV limit.
- Operational modes. Which mode(s) will give the most optimal fuel economy?
- Switchboard configuration for DP2/DP3. Experience shows that it is easy to make mistake with the switchboard configuration, which will lead to an operational cost increase and a tighter economy.
- When an incident occur or something goes wrong, how to find the faults? By means of logging, trending and event analysis.
- Load control of variable consumers. Which possibilities exists to keep stable load on the generators, even with variable loads and undesirable fall outs and disconnections?
- The most important components in the Diesel Electric Propulsion system and how they interact.
- Interface PMD – DP. What is necessary? What is correct?
- Incorrect design. Design examples, which in principle looks acceptable but might have big consequences even with simple design flaws.
- HIL test. What will be the value of such a test?

3 FMEA versus a cost – risk analysis DP2/3

Today all vessels installing DP2/3 have to carry out and complete an FMEA test. Such an FMEA test will only prove that the vessel do not lose its DP capability.
What is not at all considered is actually Time To Repair (TTR), the time that is used to obtain normal operation. In some cases there is no doubt that an inexpensive component can lead to “Off hire” for many days, even several weeks in case of being unfortunate.

- Which component do we refer to?
- How can the ship-owners insure against this and avoid such an situation. How to minimize the risk?

4 New requirements for NOx emission

What would be the consequences of the new requirements for NOx emission that was implemented January 1 st 2010 and would become mandatory 2016?

- What types of operation/systems will comply to these new requirements?
- What are the consequences for the choice of propulsion?

5 Uninterruptable Power Supply (UPS)

Today many different types of UPS`s are installed in all kind of systems onboard the vessel. It is much the same challenge as the PLC problem. See chapter 6 below.
There is no uniform standard for such UPS`s. Some uses type approved UPS`s of different kind, some uses non-approved UPS`s. There are cheap UPS`s with low graded variable specifications and there are sophisticated UPS`s with specification adopted special for marine use, such as variation in frequency (40-70 Hz). Where there are no rules or regulations required to follow, sub-contractors for sure will use cheap UPS`s.

- What impact and consequences does this have on maintenance? Well know manufacturer, availability of spares etc.
- What impact and consequences does this have on vessel operation due to downtime on a faulty UPS? Non compliancy to requirements and regulations.
- Online UPS versus a standard UPS, charging/discharging, protection, frequency variations, battery backup/battery lifetime/ battery specification etc.

6 Increased use of low-priced/Inexpensive programmable Logic Controller (PLS`s)

The price of a microprocessor or a PLC (Programmable Logic Controller), have now become so low, that the traditional relay logic is rarely used.
The introduction of this programmable relay controller, have revolutionized the process control industry in efficiency and price competitive installation.
Control tasks and issues, that earlier could take months to design and connect and test with relays, may now be downloaded in a PLC and executed in a few minutes.
Changes in the logic that earlier had to be reconnected during a process stop, may now be done in full operation with a key press, even remote via the Internet.
The number of programmable controllers has exploded in the past years, to now become a standard installation in all kind of equipment onboard a modern vessel.

What kind of problems to be addressed? The following questions can be raised;

- How many PLC`s are installed onboard?
- How many different types?
- Do the PLC have its own supply, internal battery?
- What is the consequences if the battery is not checked regularly or changed?
- Is there available software from the manufacturer of the PLC onboard?
- Which version of the PLC software is onboard?
- Which version of software is installed in the PLC
- If the software do not have the same version, what is changed? Is there any available Change Note?
- Is there any available PC onboard to load the software in to the PLC?
- Is there a special cable for loading the software, and is this cable available onboard?
- Have the upload ever been tested before the ship left the yard?

And here are some more questions to consider if there are no spare PLC onboard:

- Where to find a spare PLC?
- What is the delivery time for a spare PLC?
- Is the spare PLC exactly the same version (hardware & software) as onboard? (These types usually changes often)
- Is it the same version of firmware inside the PLC?

In addition to these questions there are even further issues that will be raised in connection to the use of PLC`s onboard. We have to ask ourselves why it looks like the ship-owners have forgotten these issues as long as the offshore industry have had strong requirements and regulations for the use of PLC`s onboard for more than 20 years already? In what way should the ship-owner safeguard himself, in the framing of the specification, to reduce or minimize these risks?

7 Gas propulsion

Gas propulsion is her to stay, and will increase its market share considerably in the near future. Lately the Norwegian Government boosted the use of gas propulsion by accepting tax reduction according to decrease of NOx emission.
However the government is today uncertain on how to interpret the regulations;

- If they should use the regulations that applies to the offshore oil industry which ensure a controlled shut down on all systems with only one single failure, for instance an Blackout, or
- If they should use the maritime regulations that will ensure propulsion maintainability if there is a fault in the system.

Today it seems that Det Norske Veritas (DNV) has decided to use the offshore regulations as a basis for gas propulsion. This choice will have vast consequences for the operation of these vessels in the future.

So what is the typical issues with gas propulsion:

- Load increase
- Load decrease
- Shut off/ shut down on gas detection
- Shut Down system
- Backup with use of Diesel

8 New vessels building specifications

It turns out very often that the new vessel building specifications related to electric design do have some defects, that the specification has flaws and are not very specific. Often we see that the owner think that the design company has control but this is not always the case. We also see that the owner think that the classification society has a responsibility that the end user gets a good product but this is not always correct either.
In many situations we see that it is up to the yards and suppliers to define, build and put together a system. Many times, when this is the case, the yards and suppliers are not very preoccupied of functions but rather the price.

- How can and should a specification be formulated to make sure that the correct components and the correct system is chosen?

Ship owners that are used to build ships in their own neighbourhood but now more and more are building ships at foreign yard needs to be more careful.

- What kind of problems can you run into?
- How to safeguard yourself?
- How to choose supplier before you choose yard and how this can be done without a price increase?

9 Discussions

HMA hopes, that with the above subjects, we can start some discussions and debates.
HMA hopes that as many as possible will be able to join this discussion so we can exchange views and gain experience from each other.